

Yamhill County

Multi-Jurisdictional Hazard Mitigation Plan Update

March 2009

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List of Acronyms and Abbreviations

ALF	Animal Liberation Front
CDC	United States Center for Disease Control
CFR	Code of Federal Regulations
cfs	cubic feet per second
CR2K	State of Oregon Fire Marshal's Community Right to Know
CRS	Community Rating System
DHS	Department of Homeland Security
DMA 2000	Disaster Mitigation Act of 2000
ELF	Earth Liberation Front
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FY	fiscal year
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HS	Hazardous Substances
M	magnitude
MHMP	Multi-Jurisdictional Hazard Mitigation Plan
MM	Modified Mercalli
mph	miles per hour
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NGO	nongovernmental organizations
NID	National Inventory of Dams
ODF	Oregon Department of Forestry
ODOT	Oregon Department of Transportation
OSFM	Oregon State Fire Marshal's Office
PDM	Pre-Disaster Mitigation
PGA	peak ground acceleration
RFC	Repetitive Flood Claims
RL	Repetitive Loss
SFHA	Special Flood Hazard Area
SR	State Road
SRL	Severe Repetitive Loss
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
URS	URS Corporation
USC	United States Code
USGS	United States Geological Survey

1. INTRODUCTION

This section provides a brief introduction to hazard mitigation planning, local mitigation plan requirements, the grants associated with these requirements, and a description of this Multi-Jurisdictional Hazard Mitigation Plan (MHMP).

1.1 HAZARD MITIGATION PLANNING

Hazard mitigation, as defined in Title 44 of the Code of Federal Regulations (CFR), Part 201.2, is “any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.” Many areas have expanded this definition to also include human-caused hazards. As such, hazard mitigation is any work done to minimize the impacts of any type of hazard event before it occurs. It aims to reduce losses from future disasters. Hazard mitigation is a process in which hazards are identified and profiled, people and facilities at risk are analyzed, and mitigation actions are developed. The implementation of the mitigation actions, which include long-term strategies that may include planning, policy changes, programs, projects, and other activities, is the end result of this process.

1.2 PLANNING REQUIREMENTS

1.2.1 Local Mitigation Plans

In recent years, local hazard mitigation planning has been driven by a new Federal law. On October 30, 2000, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Title 42 of the United States Code [USC] 5121 et seq.) by repealing the act’s previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. In addition, it provided the legal basis for the Federal Emergency Management Agency’s (FEMA) mitigation plan requirements for mitigation grant assistance.

To implement these planning requirements, FEMA published an Interim Final Rule in the *Federal Register* on February 26, 2002 (FEMA 2002a), 44 CFR Part 201 with subsequent updates. The planning requirements for local entities are described in detail in Section 2 and are identified in their appropriate sections throughout this MHMP.

FEMA’s October 31, 2007 changes to 44 CFR Part 201 combined and expanded flood mitigation planning requirements with local mitigation plans (44 CFR §201.6). All hazard mitigation assistance program planning requirements for Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Severe Repetitive Loss (SRL) and potentially Repetitive Flood Claims (RFC) programs were combined eliminating duplicated mitigation plan requirements. It also required participating National Flood Insurance Program (NFIP) communities’ risk assessments and mitigation strategies to identify and address repetitively flood damaged properties.

The July 01, 2008 FEMA crosswalk, which documents compliance with 44 CFR, is provided in Appendix L.

Under the new 2008 44 CFR update, requirements have changed governing mitigation planning requirements for local mitigation plans published under 44 CFR §201.6. Local mitigation plans now qualify communities for the following federal mitigation grant programs:

Disaster Funded Grants:

- *Hazard Mitigation Grant Program (HMGP)*

Hazard Mitigation Assistance Grants:

- *Pre-Disaster Mitigation (PDM)*
- *Flood Mitigation Assistance (FMA)*
- *Severe Repetitive Loss (SRL)*
- *Repetitive Flood Claim (RFC)*

FEMA policy may require a local mitigation plan under the RFC Program, at which time this policy will apply to those governments that apply for and/or receive assistance under the RFC program as well.

1.3 GRANT PROGRAMS REQUIRING HAZARD MITIGATION PLANS

All five FEMA grant programs provide funding to States, Tribes, and local entities that have a FEMA-approved State or Local Mitigation Plan. Two of the grants are authorized under the Stafford Act and DMA 2000, while the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. As of June 19, 2008, the grant programs were segregated. The HMGP is a state competitive grant program which is directly disaster funded. Whereas the other programs: PDM, FMA, RFC, SRL programs although competitive, rely on specific pre-disaster grant funding sources, sharing several common elements.

*The Department of Homeland Security (DHS) FEMA Hazard Mitigation Assistance (HMA) grant programs present a critical opportunity to protect individuals and property from natural hazards while simultaneously **reducing reliance on Federal disaster funds**. The HMA programs provide pre-disaster mitigation grants annually to States, Territories, Tribes, and local communities. The statutory origins of the programs differ, but all share the common goal of reducing the loss of life and property due to natural hazards.*

The PDM program is authorized by the Stafford Act and focuses on mitigation project and planning activities that address multiple natural hazards, although these activities may also address hazards caused by manmade events. The FMA program, RFC program, and SRL program are authorized by the National Flood Insurance Act (NFIA), and focus on reducing claims against the NFIP. (FEMA 2008e)

1.3.1 Disaster Funded Mitigation Assistance

Hazard Mitigation Grant Program: Provides grants to States, Tribes, and local entities to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a

project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. The program may provide a State or Tribe with up to 20 percent of the total disaster grants awarded by FEMA. The cost-share for this grant is 75 percent Federal/25 percent non-Federal.

1.3.2 Hazard Mitigation Assistance Programs

Pre-Disaster Mitigation Program: Provides funds to State, Tribes, and local entities, including public universities, for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, a PDM project's potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. In Fiscal Year (FY) 2007, PDM program funding totaled \$100 million. The 2008 PDM program funding totaled \$54 million. The cost-share for this grant is 75 percent Federal/25 percent non-Federal.

Flood Mitigation Assistance Grant Program: As noted above, the goal of the FMA grant program is to reduce or eliminate flood insurance claims under the NFIP. Particular emphasis for this program is placed on mitigating repetitive loss (RL) properties (*Repetitive loss properties: A property for which two or more NFIP losses of at least \$1,000 each have been paid within any 10 year period since 1978*). The primary source of funding for this program is the National Flood Insurance Fund. Grant funding is available for three types of grants, including Planning, Project, and Technical Assistance. Project grants, which use the majority of the program's total funding, are awarded to States, Tribes, and local entities to apply mitigation measures to reduce flood losses to properties insured under the NFIP. In FY 2007, FMA funding totaled \$31 million. The 2008 FMA program funding totaled \$35.7 million. The cost-share for this grant is 75 percent Federal/25 percent non-Federal. However, 90 percent Federal/10 percent non-Federal to mitigate SRL properties (defined below) is available in certain situations.

Severe Repetitive Loss Program: Provides funding to reduce or eliminate the long-term risk of flood damage to residential structures insured under the NFIP. Structures considered for mitigation must have at least four NFIP claim payments over \$5,000 each, when at least two such claims have occurred within any 10-year period, and the cumulative amount of such claims payments exceeds \$20,000; or for which at least two separate claims payments have been made with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any 10-year period. Congress has authorized up to \$40 million per year from FY 2005 – FY 2009. However, 2008 funding provided up to 80 million. The cost-share for this grant is 75 percent Federal/25 percent non-Federal. However, 90 percent Federal/10 percent non-Federal to mitigate SRL properties is available when the State or Tribal plan addresses ways to mitigate SRL properties.

Repetitive Flood Claims Program: Provides funding to reduce or eliminate the long-term risk of flood damage to residential and nonresidential structures insured under the NFIP. Structures considered for mitigation must have had one or more claim payments for flood damages. In FY

2007 and 2008, Congress appropriated \$10 million for the implementation of this program. All RFC grants are eligible for up to 100 percent Federal assistance.

1.4 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DESCRIPTION

The remainder of this MHMP consists of the following sections and appendices:

Prerequisites – This section addresses the prerequisites of plan adoption, which include adoption by the governing body of each participating jurisdiction, including Yamhill County and the cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina and Yamhill City. **Adoption resolutions for each jurisdiction are included in Appendix M.**

Community Description - Provides a general history and background of the communities and unincorporated areas of Yamhill County, including historical trends for population and the demographic and economic conditions that have shaped the area. Trends in land use and development are also discussed (Figure K-1).

Planning Process - Describes the planning process and identifies Steering Committee members who assisted in the formation of the hazard mitigation planning process, the meetings held as part of the planning process (Appendix N), and key stakeholders within the county and surrounding region. In addition, this section documents public outreach activities (Appendix O) and the review and incorporation of relevant plans, reports, and other appropriate information.

Hazard Analysis - Describes the process used by the Steering Committees to identify, screen, and select the 16 hazards to be profiled in this version of the MHMP. The hazard analysis includes the nature, history, location, extent, and probability of future events for each hazard. In addition, historical and location hazard figures are included in Appendix K.

Vulnerability Analysis - Identifies potentially vulnerable assets—people, residential and nonresidential buildings, dwelling units, RL properties, critical facilities, and critical infrastructure—in the incorporated cities and unincorporated areas of the county. These data were compiled by assessing the potential impacts from each hazard using Geographic Information System (GIS) and community provided information. The resulting information identifies the full range of hazards that the incorporated cities and unincorporated areas of the county could face potential impacts, damages, and (where data was available) economic losses.

Mitigation Strategy - Provides a blueprint for reducing the potential losses identified in the vulnerability analysis. The Steering Committees developed a list of mitigation goals and potential actions to address the risks facing Yamhill County and the nine incorporated cities. Mitigation actions include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public information and awareness activities. In addition, mitigation strategies are developed for continued compliance with the NFIP and the reduction of flood damage to flood-prone structures, including any RL property. The Steering Committees selected relevant mitigation actions and strategies to implement county-wide.

County and city-specific mitigation strategies, including capability assessments, are provided in Appendices A through J.

Plan Maintenance - This section describes the Steering Committees' formal plan maintenance process to ensure that the MHMP remains an active and applicable document. The process

includes monitoring, evaluating, and updating the MHMP; implementation through existing planning mechanisms; and continued public involvement (community specific appendices). Suggested Plan Maintenance documents are located in Appendix Q.

References - Lists the reference materials used to prepare this MHMP.

Appendices - Appendices A through J provide the vulnerability analyses and mitigation strategies, including the capability assessments, for Yamhill County and the cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina, and Yamhill City.

Appendix K includes the figures that identify known hazard areas, previous hazard occurrences, and critical assets.

Appendix L provides the FEMA crosswalk, which documents compliance with 44 CFR for both the Local Mitigation Plan requirements.

Appendix M provides the adoption resolutions for Yamhill County and the cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina and Yamhill City.

Appendix N contains the Steering Committees meeting agendas and handouts.

Appendix O provides public outreach information, including press releases, information posted on Yamhill County's and participating jurisdiction's websites, and public workshop material.

Appendix P contains the Benefit-Cost Analysis Fact Sheet used to select and prioritize mitigation actions.

Appendix Q provides the plan maintenance documents, such as an annual review sheet and the progress report form.

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2. PREREQUISITES

2.1 ADOPTION BY LOCAL GOVERNING BODIES AND SUPPORTING DOCUMENTATION

The requirements for the adoption of this MHMP by the participating local governing bodies, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PREREQUISITES

Multi-Jurisdictional Plan Adoption

Requirement §201.6(c)(5): For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Element

- Does the new or updated plan indicate the specific jurisdictions represented in the plan?
- For each jurisdiction, has the local governing body adopted the new or updated plan?
- Is supporting documentation, such as a resolution, included for each participating jurisdiction?

Source: FEMA, July 2008.

Yamhill County and the cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina and Yamhill City are the jurisdictions represented in this MHMP and meet the requirements of Section 322 of the DMA 2000.

The local governing body of Yamhill County and the cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina and Yamhill City have adopted the MHMP by resolution. A scanned copy of each resolution is included in Appendix M.

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3. COMMUNITY DESCRIPTION

This section describes the location, geography, and history; demographics; and land use development trends of Yamhill County and the cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina and Yamhill City.

3.1 LOCATION, GEOGRAPHY, AND HISTORY

Yamhill County is in the Willamette River basin in northwestern Willamette Valley, and lies east of the Coast Range and west of the Cascade Mountain Range. Located in the northwestern interior of Oregon, the county encompasses approximately 718 square miles. The county is the center of Oregon's wine industry with over 80 wineries and 200 vineyards. Primary markets include agricultural production and timber. Yamhill County, thought to be named for the historic Yamhill Indians (now part of the Confederated Tribes of the Grand Ronde), was created in 1843, first as a district, and then in 1847 was made a county seat based in Lafayette. The county government later moved to McMinnville where it resides today. The area has been inhabited for over 8,000 years and the establishment of the Oregon Trail led significant migration to the area.

3.2 DEMOGRAPHICS

3.2.1 Yamhill County

The population of Yamhill County increased by almost 12 percent between 2000 and 2007 from 84,992 to 96,573 residents, accounting for 2.5 percent of Oregon's total population. The largest cities by population are McMinnville, Newberg, and Sheridan. (Yamhill County HMP 2006) The median household income in 2000 was \$44,111 and rose to \$47,805 in 2006, representing an increase of 7.7 percent. In 2006, there were 34,906 housing units with 15.8 percent being multi-unit structures. In 2000, there were 30,270 housing units. Median housing values increased from \$146,200 in 2000 to \$219,200 in 2006. Renters occupied 10,519 units in 2006 and median rent was \$672. (U.S. Census 2000, 2006)

In 2000, 41,891 individuals 16 years and over were in the labor force. The unemployment rate was 6.4 percent. In 2006, 66.6 percent or 49,252 individuals 16 years and over were in the labor force. Almost 92 percent (45,114) were employed, and just over 8 percent (4,038) were unemployed. Between 2000 and 2006, the number of families and individuals living below the poverty level increased. In 2000, 6.0 percent of families and 9.2 percent of individuals lived below the poverty level. In 2006, 10.3 percent of families, and 15.1 percent of individuals lived below the poverty level. (U.S. Census 2000, 2006) The economy of Yamhill County has traditionally lacked diversity and is based on agricultural and forestry related industries. Therefore, the county has experienced high levels of unemployment. (Yamhill County Comprehensive Land Use Plan 1996)

3.2.2 City of Amity

The City of Amity is located in the northwest Willamette Valley near the southern border of Yamhill County. In 2006, the population was 1,480 residents. (Oregon Blue Book 2008) The 2000 Census reported 9.3 percent of the population is under five years of age, 66.2 percent are between the ages of 18 and 64, and 8.7 percent of the population is 65 years or older. Of the City of Amity's 1,065 residents eligible for the labor force, 712 were employed, and the unemployment rate was 5.6 percent. The 2000 median household income was \$40,556 and the median family income was \$42,375. The City of Amity's per capita income in 2000 was

\$13,563. Nearly nine percent of families were living below the poverty level in 2000. In that same year, 9.6 percent of individuals were also living below the poverty level.

3.2.3 City of Carlton

The City of Carlton is located in central Yamhill County and occupies the highland between Hawn Creek and North Yamhill River. In 2006, the population was 1,670 residents. (Oregon Blue Book 2008) According to the U.S. Census (2000), 8.4 percent of the population is under five years of age, 68.7 percent are between the ages of 18 and 64, and 9.2 percent of the population are 65 years or older. Of the City of Carlton's 1,132 residents eligible for the labor force, 779 were employed, and the unemployment rate was 3.4 percent. The 2000 median household income was \$41,287, and the median family income was \$45,972. The City of Carlton's per capita income in 2000 was \$16,580. Four and one half percent of families were living below the poverty level in 2000. In that same year, 6.7 percent of individuals were also living below the poverty level.

3.2.4 City of Dayton

The City of Dayton is located in the northwest Willamette Valley in central Yamhill County. In 2007, the population was 2,495 residents. (Hollis 2008) According to the U.S. Census (2000), 8.3 percent of the population is under five years of age, 63.3 percent are between the ages of 18 and 64, and 7.6 percent of the population is 65 years or older. Of the City of Dayton's 1,408 residents eligible for the labor force, 863 were employed, and the unemployment rate was 4.4 percent. The 2000 median household income was \$40,556, and the median family income was \$43,047. The City of Dayton's per capita income in 2000 was \$ 13,140. Nearly 12 percent of families were living below the poverty level in 2000. In that same year, 14.1 percent of individuals were also living below the poverty level.

3.2.5 City of Dundee

The City of Dundee is located in western Willamette Valley. In 2007, the population was 3,040. (Daykin 2008) According to the U.S. Census (2000), 8.1 percent of the population is under five years of age, 69.4 percent are between the ages of 18 and 64 years, and 9.2 percent of the population is 65 years or older. Of the City of Dundee's 1,290 residents eligible for the labor force, 1,243 were employed, and the unemployment rate was 2.5 percent. The 2000 median household income was \$50,284 and the median family income was \$56,429. The City's per capita income in 2000 was \$20,455. Nearly 5.7 percent of the City of Dundee's families were living below the poverty level in 2000. In that same year, 6.6 percent of individuals were also living below the poverty level.

3.2.6 City of Lafayette

The City of Lafayette is located on the main Indian trail that traversed the northwest Willamette Valley at a point on the Yamhill River known for years as Yamhill Falls. Their population in 2007 was 3,730. (Rinks 2008) According to the U.S. Census (2000), 10.3 percent of the population is under five years of age, 67.3 percent are between the ages of 18 and 64, and 7.8 percent of the population is 65 years or older. Of the City of Lafayette's 1,250 residents eligible for the labor force, 1,120 were employed, and the unemployment rate was 7.2 percent. The 2000 median household income was \$38,611 and the median family income was \$41,283. The City's per capita income in 2000 was \$ 14,542. Nearly 11 percent of the City of Lafayette's families

were living below the poverty level in 2000. In that same year, 13 percent of individuals were also living below the poverty level.

3.2.7 City of Newberg

The City of Newberg is located in the northeast corner of Yamhill County, Oregon, on the north side of the Willamette River. Their population in 2007 was 21,675. (PSU 2007) According to the U.S. Census (2000), eight percent of the population is under five years of age, 72.3 percent are between the ages of 18 and 64, and 10.6 percent of the population is 65 years or older. Of the City of Newberg's 9,761 residents eligible for the labor force, 9,079 were employed, and the unemployment rate was 4.9 percent. The 2000 median household income was \$44,206 and the median family income was \$51,084. The City of Newberg's per capita income in 2000 was \$16,873. Four and three-tenths percent of families were living below the poverty level in 2000. In that same year, 6.6 percent of individuals were also living below the poverty level.

3.2.8 City of Sheridan

The City of Sheridan is located in the Western Willamette Valley. The population in 2006 was 5,785. (Oregon Blue Book 2008) According to the U.S. Census (2000), 8.2 percent of the population is under five years of age, 69.2 percent are between the ages of 18 and 64, and 12 percent of the population is 65 years or older. Of the City of Sheridan's 1,638 residents eligible for the labor force, 1,493 were employed, and the unemployment rate was 5.6 percent. The 2000 median household income was \$36,673 and the median family income was \$39,858. The City of Sheridan's per capita income in 2000 was \$ 13,426. Nearly ten percent of the City's families were living below the poverty level in 2000. In that same year, 14.4 percent of individuals were also living below the poverty level.

3.2.9 City of Willamina

The City of Willamina is located in the western Willamette Valley. Their population in 2006 was 1,885. (Oregon Blue Book 2008) According to the U.S. Census (2000), 8.1 percent of the population is under five years of age, 67.6 percent are between the ages of 18 and 64, and 10.4 percent of the population is 65 years or older. Of the City of Willamina's 891 residents eligible for the labor force, 850 were employed, and the unemployment rate was 3.0 percent. The 2000 median household income was \$32,326 and the median family income was \$37,250. The City's per capita income in 2000 was \$13,349. Nearly 11 percent of the City of Willamina's families were living below the poverty level in 2000. In that same year, 14.3 percent of individuals were also living below the poverty level.

3.2.10 Yamhill City

Yamhill City is located in the northwest Willamette Valley. In 2007, the population was 820. (OECD 2008) According to the U.S. Census (2000), 6.4 percent of the population is under five years of age, 68.3 percent are between the ages of 18 and 64, and 7.2 percent of the population is 65 years or older. Of Yamhill City's 462 residents eligible for the labor force, 441 were employed, and the unemployment rate was 3.4 percent. The 2000 median household income was \$49,688 and the median family income was \$52,344. The City's per capita income in 2000 was \$ 16,745. Five percent of Yamhill City's families were living below the poverty level in 2000. In that same year, 5.3 percent of individuals were also living below the poverty level.

3.3 LAND USE AND DEVELOPMENT TRENDS

Land use in Yamhill County is a mix of residential, commercial, and agricultural. In 2006, more than 97 percent of land was zoned for agricultural or forest use. (Yamhill County HMP 2006) Growth within the county is mainly influenced by people employed in Portland seeking to live outside the city; with the northeast section of the county seeing the most growth. Land planners are concerned with the expansion of urban development into rural areas. Land use planning in Yamhill County intends to control sprawl and costs associated with providing public facilities and services, and create an orderly growth pattern within the existing urban areas. (Yamhill County Comprehensive Land Use Plan 1996)

There is pressure to allow growth in rural areas which would increase costs of providing community services and produce conflicts between farming and urban activities. Expansion of development in rural areas causes loss of open space and affects scenic views. It also threatens to remove valuable, much needed farm lands from agricultural uses. Agriculture plays a significant role in the county's economy with much of the soils having high quality agricultural potential. Expansion into these areas threatens to decrease agricultural productivity. (Yamhill County Comprehensive Land Use Plan 1996)

The timber industry provides employment and wood products and is also the number one export. Nearly half the land use in the county is designated as commercial forestry. In addition, forest lands provide watersheds areas for cities, habitat for fish and wildlife, and recreational opportunities. Several sensitive wildlife habitat areas exist in the county that supports upland game, fur bearers, anadromous and warm water fish, water fowl, and a variety of non-game species. (Yamhill County Comprehensive Land Use Plan 1996)

The ten cities in Yamhill County have established urban growth boundaries, and McMinnville and Newberg are experiencing growth pressure and are vulnerable to land use conflicts. The quantity and quality of existing housing is a problem in Yamhill County. There are numerous housing units needing rehabilitation. In 1978, the county adopted the Uniform Building Code, Uniform Mechanical Code, and Uniform Plumbing Code as published by the International Conference of Building Officials. Through regulation and legislation, the county seeks to control housing types, location, density and costs. (Yamhill County Comprehensive Land Use Plan 1996)

4. PLANNING PROCESS

This section provides an overview of the planning process; identifies the Steering Committee members and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop this MHMP. Additional information regarding the Steering Committee and public outreach efforts is provided in Appendices N and O.

The requirements for the planning process, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process. Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): The plan shall document the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?
- Does the new or updated plan indicate how the public was involved? Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The 2006 Yamhill County Natural Hazards Mitigation Plan described the hazards, critical facilities, and resulting mitigation goals and actions for county-owned facilities. This document reviews and updates the Yamhill County's original plan and addresses the new participating jurisdictions of the Cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina, and Yamhill City in a single document.

The City of McMinnville is not participating in this hazard mitigation planning process. However, the document has been designed to easily add the jurisdiction should they choose to participate in the future.

4.1 OVERVIEW OF PLANNING PROCESS

4.1.1 Initial Planning Process, 2003

Yamhill County Emergency Management, Mid-Willamette Valley Council of Governments, and Oregon Natural Hazards Workgroup combined resources to form the Hazard Mitigation Plan Steering Committee and collaboratively develop the 2006 Natural Hazards Mitigation Plan. (ONHW 2006)

The following Steering Committee and Project Team members assisted in development of the 2006 HMP. The 2006 Steering Committee consisted of Project Managers Mark Fancey and Judith Ingram Moore of the Mid-Willamette Valley Council of Governments. Committee members from Yamhill County included John Caputo, Planning Director; Ken Friday, GIS Analyst; Kathy George, Planning Division Manager; Bill Gille, Commissioner; Chris Johnson, Public Works Director; John Krawczyk, Public Health & Human Services; Leslie Lewis, Administrator; Jay Lilly, Commissioner; and Bob Maca, Emergency Management Coordinator. Other Committee participants included Dean Bender, community member; McMinnville Fire Department Chief; and Mike Brandt, Polk County Emergency Manager. The Project Team consisted of the Oregon Natural Hazards Workgroup and participants included Andre LeDuc, Director; David Reesor, Team Manager, and team members Robert Richardson, Alison Thayer, and Tina Nunez.

The committee received input from the following Yamhill County agencies and citizens: county departments, countywide fire districts, businesses, school districts, education service districts, colleges, Yamhill Basin Council Coordinator, soil and water conservation districts, the Oregon Department of Forestry, U.S. Bureau of Land Management, public utilities and the incorporated jurisdictions' representatives. GIS maps were provided by the Mid-Willamette Valley Council of Governments and Yamhill County GIS staff.

In adherence with DMA 2000 requirements, the Steering Committee met eight times from September 2004 through April 2005 to establish an outline, schedule, and develop plan goals and objectives; and to write the hazard mitigation plan. The Project Team gathered and shared information, assessed vulnerabilities, identified critical facilities, developed mitigation strategies, and provided continuity throughout the planning process.

During the nine-month planning period, the Project Team compiled information and collected data for seven natural hazards, including flood, landslide, wildfire, severe winter storm, windstorm, drought, and earthquake. Information was obtained from local historical records, and a variety of local, state, and federal agencies. In addition, public input was sought

throughout the planning process. The Steering Committee interviewed stakeholders, listened to community member input, and held a public open house on April 20, 2005.

The 2006 Hazard Mitigation Plan forms the basis for the county's new MHMP's focus. The plan identified six planning goals, developed action items to refine goal achievement, provided a matrix for use in delineating the roles of coordinating and partner organizations, provided timelines for achieving goals, notes implementation ideas, and lists specific planning goals addressed by each action item.

The Steering Committee and Project Team provided a solid foundation for future Yamhill County hazard mitigation planning update efforts. It is the intent of this 2009 MHMP to include newly identified hazards affecting individual jurisdictions, provide a comprehensive risk assessment and vulnerability analysis, focus on community based mitigation actions, and identify defined funding sources.

4.1.2 2009 Plan Update

This 2009 Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update is intended to: include newly identified hazards affecting individual jurisdictions; provide a comprehensive risk assessment and vulnerability analysis; provide community based mitigation actions; identify funding sources; and include the incorporated jurisdictions within the county as part of the update.

FEMA provided technical assistance to facilitate developing this MHMP. This includes updating the portions of the existing plan for the unincorporated areas within the County as well as including the incorporated jurisdictions (Cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina, and Yamhill City).

The first step in the planning process was to establish Steering Committees within each participating jurisdiction. These Steering Committees consisted of county and city representatives, and representatives from the rural fire districts within the County. John Boynton Yamhill County Emergency Manager, and Laura Tschabold, County Administrator served as the primary points of contact for the overall plan update and development. The current point of contact for the planning effort is Doug McGillivray, the new County Emergency Manager. Table 4-1 identifies the Steering Committee leaders and participants from each jurisdiction.

Once the Steering Committees were formed, the following six-step planning process took place from April 2008 to February 2009.

- **Organize Resources:** The Steering Committees identified resources, including county staff, city departments and agencies, and local non-governmental organizations (NGOs), which could provide the technical expertise and historical information needed to update the MHMP.
- **Profile Hazards:** Each Steering Committee identified the hazards specific to Yamhill County and the cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina, and Yamhill City. A hazard analysis was developed for these 16 hazards.

- **Assess Risks:** A vulnerability analysis was developed for the county and each of the incorporated communities. The county and incorporated communities used the vulnerability analyses results the mitigation strategy development.
- **Assess Capabilities:** Each Steering Committee reviewed the current administrative and technical, legal and regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately address relevant hazards in each respective jurisdiction.
- **Develop Mitigation Strategy:** Each Steering Committee developed a comprehensive range of potential mitigation goals and actions. Subsequently, Yamhill County and the incorporated communities identified, evaluated, and prioritized the actions to be implemented in the county- and city-specific Mitigation Action Plans (Appendices A-J).
- **Monitor Progress:** Each Steering Committee developed an implementation process to ensure the success of an ongoing program to minimize hazard impacts to Yamhill County and the incorporated communities.

4.2 HAZARD MITIGATION STEERING COMMITTEE

4.2.1 Formation of the Steering Committee

This planning update process began in April 2008. Each Steering Committee leader formed the advisory body, known as the Steering Committee, using staff from relevant local departments, agencies, and NGOs. The Steering Committee members represent community members within Yamhill County and each of the county's nine participating incorporated cities, are listed in Table 4-1 and the meetings held throughout the planning process are described below. In addition, the meeting agendas and handouts are provided in Appendix N.

Table 4-1. Steering Committees

Name	Agency/Department
Yamhill County	
Doug McGillivray	County Emergency Manager (Current)
Laura Tschabold	County Administrator
John Boynton	County Emergency Manager
Karen McFaddin	County Emergency Management
Janean Douglas	County Emergency Management
Jennifer Busey	County Emergency Management
City of Amity	
Michael Cape	Mayor
Jennifer Elkins	City Recorder
Matt Johnson	Public Works
Charles Eaton	Contract Engineer
City of Carlton	
Steven Weaver	City Manager
Brian Burnham	Public Works Director
Frank Butler	Police Chief
Roy Durfee	Carlton Elementary School, School District Facilities Director
Suzanne Dufner	City Planner (Contract)

Table 4-1. Steering Committees

Name	Agency/Department
Peter Blumenthal	City Engineer (Contract)
Terry Lucich	District Fire Chief
City of Dayton	
Sue Hollis	City Manager
City of Dundee	
Rob Daykin	City Administrator
Alan Mustain	Superintendent of Public Works
John Stock	Fire Chief
Brian Casey	Police Chief (Contract)
Luke Eelz	Planner (Contract)
City of Lafayette	
Diane Rinks	City Administrator
Don Leard	Mayor
Terry Lucich	Fire Chief
Jim Anderson	Public Works Foreman
City of Newberg	
Roger Gano	Emergency Manager
Jean Nilles	Retired Business Owner
Elvern Hall	Retired Business Manager
Stan Gaibler	Retired Farmer
Ken Austin III	
Spike Sumner	
Sherry Walker	
City of Sheridan	
Frank Sheridan	City Manager
Yvonne Hamilton	Deputy City Recorder
City of Willamina	
Chris Ann Harris	Office Coordinator
Jeff Brown	Public Works Superintendent
Charlene Brown	Museum Curator
Dave Morey	Fire Department
Matt Reneiss	Fire Department
Yamhill City	
Richard Howard Senior	Public Works Superintendent

4.2.2 Planning Team Meetings and Tasks

FEMA’s contractor, URS Corporation, provided technical guidance throughout the planning process.

April 14, 2008

During the kickoff meeting, Kristen Meyers of FEMA Region X and Dennis Segrist of the State of Oregon, Office of Emergency Management discussed the project objective to update Yamhill County’s existing mitigation plan to include the incorporated cities within the county with the end result of a multi-jurisdictional all-hazards mitigation plan. The DMA 2000 requirements,

the hazard mitigation planning process, public outreach opportunities, and mitigation projects and grant funding opportunities were also discussed. In addition, the use of GIS technology as a tool for identifying and mapping known hazards throughout the county was reviewed. Also discussed was the need for each jurisdiction to identify a Steering Committee to network with the citizens of Yamhill County within their community, other agencies, and other professionals who might have specialized knowledge about the hazards potentially affecting the county.

Each jurisdiction filled out data collection forms to assist in identifying necessary information to be included in the plan with a proposed schedule for each of the six sections. The sections included:

- ☐ Community Description Data
- ☐ Hazard Identification & History Data
- ☐ Repetitive Loss Data
- ☐ Vulnerability Data (Critical Facilities)
- ☐ Planning Data (Steering Committee, Methods of Public Engagement)
- ☐ Capability Assessment Data

The hazard identification data collection form was based on the State of Oregon Natural Hazards Mitigation Plan and the existing Yamhill County Hazard Mitigation Plan and is meant to familiarize city representatives with the approach and concepts used in the risk identification phase of MHMP development. Sixteen hazards were determined to pose the greatest potential risk in Yamhill County and participating jurisdictions. Those include flood, winter storm, landslide, wildland/urban fire, earthquake, volcano, wind, erosion, El Niño and La Niña, expansive soils, drought, dam failure, disruption of utility and transportation systems, hazardous materials, terrorism, and epidemic.

Over the next three months URS facilitated teleconferences (considered meeting #2) with each participating jurisdiction's Steering Committee to complete the data collection effort.

August 15 and 18, 2008

During the third and fourth public meetings, the Steering Committees and the general public review the draft hazard figures and the data used to develop each figure. They reviewed the draft asset information (critical facilities and infrastructure, population, and residential and nonresidential structures) for Yamhill County and the participating jurisdictions. Preliminary county- and city-specific vulnerability analyses information was presented. Next, the Steering Committee examined and revised the initial list of mitigation goals and potential action items.

After the Steering Committee members reviewed the simplified Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLE/E) evaluation criteria, the members identified and prioritized the mitigation action items to be included in the MHMP.

September 2, 2008`

The Steering Committee for Dayton determined it would be appropriate to add erosion to the list of hazards potentially affecting their community.

September 3, 2008

The Steering Committee for Sheridan determined it would be appropriate to add erosion, and pandemic/epidemic to the list of hazards potentially affecting their community.

September 4, 2008

The Steering Committee for Carlton determined it would be appropriate to add erosion, windstorm, expansive soils, terrorism, and pandemic/epidemic to the list of hazards potentially affecting their community.

September 8, 2008

The Steering Committee for Newberg determined it would be appropriate to add volcano, El Nino/La Nina, and utility and transportation system disruption to the list of hazards potentially affecting their community.

September 9, 2008

The Steering Committee for Lafayette determined the following changes to their hazard profile list would be appropriate. They decided to delete drought from the hazard profile list, and to add volcano and hazardous materials.

September 16, 2008

The Steering Committee for Dundee determined that it would be appropriate to add erosion to the list of hazards potentially affecting their community

September 17, 2008

The Steering Committee for Willamina determined landslide potential for their city is very low and has decided to remove it from the list of potential hazards that could affect their city (this decision was later revised due to community interest). The committee determined it would be appropriate to add erosion and utility and transportation system disruption to the list of hazards potentially affecting their community.

4.3 PUBLIC INVOLVEMENT

4.3.1 Project Introduction

In early May 2008, shortly after the first Steering Committee meetings, a newsletter was distributed throughout the county regarding the preparation of the MHMP. The newsletter was sent out through utility bills and posted on websites inviting the public, local, State, and Federal districts and agencies to participate in the planning process. Other media outlets used included newspapers and local radio stations.

Prior to the August 15 and 18, 2008 meeting, another public meeting announcement newsletter was published throughout the county inviting the public to participate in the risk assessment presentation.

Copies of the newsletters and public meeting announcements are included in Appendix O and the public involvement mechanisms used are included in each jurisdiction specific appendix (Appendices A-J).

4.4 INCORPORATION OF EXISTING PLANS AND OTHER RELEVANT INFORMATION

During the planning process, the Steering Committees reviewed and incorporated information from existing plans, studies, reports, and technical reports into the MHMP. A detailed list of references used throughout the document is included in Section 9. A synopsis of the sources follows.

- *Yamhill County Natural Hazards Mitigation Plan*: The Yamhill County Natural Hazards Mitigation Plan includes resources and information to assist county residents, public and private sector organizations and others interested in participating in natural hazard mitigation activities.
- *Yamhill County Comprehensive Plan*: The land use element provided information on existing land use and future development trends. The safety element provided information for the hazard profiles and development of the mitigation strategy for landslides, fire, and flood hazards. The seismic safety element provided information for the hazard profile section and the mitigation strategy for earthquakes and tsunamis.
- *Yamhill County Comprehensive Land Use Plan*. This plan provides guidance on urban growth, change, and economic development; land and water conservation; transportation, communication, and public utilities; public land, facilities, and services; environmental quality; and energy conservation. It also suggests ways to implement, evaluate, and review land use.
- *Yamhill County Zoning Ordinance*: These codes regulate development and land use; they were used to develop the capability assessment and the mitigation strategy.
- *Lower Yamhill Watershed Assessment*: The overriding purpose of the assessment is to evaluate the natural and human processes influencing the watershed's ability to produce clean water and suitable habitat for aquatic life
- *Oregon's Enhanced State Natural Hazard Mitigation Plan*: This plan, prepared by the State Interagency Hazard Mitigation Team, was consulted to establish consistency with the State hazard mitigation plan.

Appendices B through J include the incorporated city-specific existing plans, studies, and reports used during the update.

5. HAZARD PROFILES

This section identifies and profiles the hazards that could affect Yamhill County.

5.1 OVERVIEW OF A HAZARD ANALYSIS

A hazard analysis includes the identification, screening, and subsequent profiling of each hazard. Hazard identification is the process of recognizing the natural and human-caused events that threaten an area. Natural hazards result from unexpected or uncontrollable natural events of sufficient magnitude. Human-caused hazards result from human activity and include technological hazards and terrorism. Technological hazards are generally accidental or result from events with unintended consequences (for example, an accidental hazardous materials release). Terrorism is defined as the calculated use of violence (or threat of violence) to attain goals that are political, religious, or ideological in nature. Even though a particular hazard may not have occurred in recent history in the study area, all hazards that may potentially affect the study area are considered; the hazards that are unlikely to occur, or for which the risk of damage is accepted as being very low, are eliminated from consideration.

Hazard profiling is accomplished by describing hazards in terms of their nature, history, magnitude, frequency, location, and probability. Hazards are identified through the collection of historical and anecdotal information, review of existing plans and studies, and preparation of hazard maps of the study area. Hazard maps are used to determine the geographic extent of the hazard and define the approximate boundaries of the areas at risk.

5.2 HAZARD IDENTIFICATION AND SCREENING

The requirements for hazard identification, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards

Identifying Hazards

Requirement §201.6I(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.

Element

- Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?

Source: FEMA, July 2008.

The Steering Committees identified 19 possible hazards that could affect Yamhill County and the participating communities. The Steering Committees evaluated and screened the comprehensive list of potential hazards based on a range of factors, including prior knowledge or perception of the relative risk presented by each hazard, the ability to mitigate the hazard, and the known or expected availability of information on the hazard (Table 5-1). The Steering Committees determined that 16 hazards pose the greatest threat to the county: flood, winter storm, landslide, wildland/urban fire, earthquake, volcano, wind, erosion, El Niño and La Niña, expansive soils, drought, dam failure, disruption of utility and transportation systems, hazardous materials, terrorism, and infectious disease epidemic. The remaining hazards excluded through the screening process were considered to pose a lower threat to life and property in the county due to the low likelihood of occurrence or the low probability that life and property would be significantly affected.

Table 5-1. Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Natural Hazards		
Avalanche	No	Yamhill County is not located in an area prone to frequent or significant snowfall.
Erosion (Riverine)	Yes	Yamhill County is located inland and is not subject to coastal erosion. Riverine and tributary erosion occurs throughout the county in localized area.
Drought	Yes	Similar to the entire State of Oregon, Yamhill County is subject to impacts associated with drought.
Dust Storm	No	No historic events have occurred in Yamhill County or other jurisdictions.
Earthquake	Yes	Yamhill County is located within the geographical area bordering the Cascadia Subduction Zone and is subject to impacts associated with earthquakes.
El Niño / La Niña	Yes	Historic El Niño / La Niña patterns have been observed affecting weather patterns throughout the state.
Expansive Soils	Yes	Impacts associated with expansive soils were identified as a hazard by the City of Carlton's Steering Committee.
Flood	Yes	Historic flooding has been identified as occurring throughout Yamhill County.
Landslide/Debris Flow	Yes	Yamhill County is vulnerable to slope instability, especially after prolonged rainfalls.
Tsunami	No	Yamhill County is located inland and is not subject to tsunami impacts.
Volcano	Yes	Yamhill County is located in the vicinity of active volcanoes.
Wind	Yes	Yamhill County is vulnerable to high winds.
Winter Storm	Yes	Winter storms in Yamhill County result in several natural hazards-including floods, ice formations, snow, and wind.
Fire: Wildland/Urban Conflagration	Yes	The terrain, vegetation, and weather conditions in the region are favorable for the ignition and rapid spread of wildland fires in Yamhill County.
Man-Made/Technological Hazards		
Dam Failure	Yes	Several dams are located within Yamhill County.
Disruption of Utility and Transportation Systems	Yes	Yamhill County is subject to the impacts of disruption of utility and transportation systems.
Hazardous Materials	Yes	Hazardous materials facilities and major transportation routes are located throughout Yamhill County and all jurisdictions.
Terrorism	Yes	Terrorism impacts have been identified in several jurisdictions within Yamhill County.
Infectious Disease Epidemic	Yes	One jurisdiction identified Infectious Disease Epidemic impacts.

Table 5-2 shows the natural and technological hazards for the County and participating jurisdictions and the newly identified hazards (noted with an *) for the County's update process. Erosion, El Niño / La Niña, Volcano, Expansive Soils, dam failure, disruption of utility and transportation systems, hazardous materials, terrorism, and infectious disease epidemic are

the newly identified hazards. Again, where hazards were excluded through the screening process by each jurisdiction, they were considered to pose a lower threat to life and property due to the low likelihood of occurrence or the low probability that life and property would be significantly affected. Should the risk from these hazards increase in the future, the MHMP can be updated to incorporate vulnerability analyses for these and other identified hazards.

Table 5-2. Hazards by Jurisdiction

Hazard	Yamhill County	City of Amity	City of Carlton	City of Dayton	City of Dundee	City of Lafayette	City of Newberg	City of Sheridan	City of Willamina	Yamhill City
Flood	X	X	X	X	X	X	X	X	X	X
Winter Storm	X	X	X	X	X	X	X	X	X	X
Landslide	X		X	X	X	X	X	X	X	X
Fire (Wildland/Urban)	X	X	X	X	X	X	X	X	X	X
Earthquake	X	X	X	X	X	X	X	X	X	X
Volcano*	X		X	X	X	X	X	X	X	
Wind	X	X	X	X	X	X	X	X	X	X
Erosion*	X		X	X	X		X		X	
ENSO (El Niño / La Niña)*	X	X	X	X			X			
Expansive Soils*	X		X							
Drought	X	X	X	X	X		X	X	X	X
Dam Failure*	X		X					X	X	
Disruption of Utility and Transportation Systems*	X	X	X	X	X	X	X	X	X	
Hazardous Materials*	X	X	X	X	X	X	X	X	X	X
Terrorism*	X	X	X				X		X	X
Infectious Disease Epidemic*			X							

5.3 HAZARD PROFILE

The requirements for hazard profiles, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Risk Assessment-Profiling Hazards
Profiling Hazards Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events. Element <ul style="list-style-type: none"> Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan? Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?

- Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?
- Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?

Source: FEMA, July 2008.

The specific hazards selected by the Steering Committees for profiling have been examined in a methodical manner based on the following factors:

- Nature
- History
- Location
- Extent
- Probability of future events

The order of presentation does not signify the level of importance or risk.

5.3.1 Flood

5.3.1.1 Nature

A flood is the temporary inundation of water or mud on normally dry land. Heavy or prolonged rain, snowmelt, or dam collapse can cause inundation, as can riverine and flash floods. (NOAA 2008) Urban and riverine flooding primarily affect Yamhill County.

Urban flooding occurs in developed areas where the amount of water generated from rainfall and runoff exceeds the stormwater systems' capacity. As land is converted from agricultural and forest to urban uses, it often loses its ability to adsorb rainfall. Rain flows over impervious surfaces such as concrete and asphalt and into nearby storm sewers and streams. This runoff can result in the rapid rise of floodwaters. During urban floods, streets can become inundated, and basements can fill with water. Storm drains often back up because of the volume of water and become blocked by vegetative debris like yard waste, which can cause additional flooding. Development in the floodplain can raise the base flood elevation and cause floodwaters to expand past their historic floodplains. (FEMA 2008c)

Riverine or overbank flooding of rivers and streams is the most common type of flood hazard. Riverine flooding most frequently occurs in winter and late spring. Air rises and cools over the Coast Range and its foothills and heavy rainfall develops over high-elevation streams, as storms move from the Pacific across the Oregon Coast. In this region, as much as four to six inches of rain can fall over a 24-hour period. Severe and prolonged storms can raise rivers and streams to their flood stages for three to four days or longer. (State of Oregon 2008)

Floods usually are the result of prolonged rainfall over a large area from major weather systems that cause flooding of smaller streams that flow into major rivers. This type of flood and inundation of the natural floodplains of the river system is a part of the natural process. Development in or near the floodplain puts lives and property at risk.

Flood damage can include:

- Inundation of structures
- Erosion of stream banks, road embankments, foundations, footings for bridge piers and other features
- Impact damage from high-velocity flow and from debris
- Additional debris damage from accumulation on or blockage of infrastructure
- Destruction of croplands
- Release of sewage and hazardous or toxic materials from damaged pipelines, tanks, and facilities
- Economic loss (local facilities, utilities, communications, agriculture)

5.3.1.2 History

The Willamette, North Yamhill, and South Yamhill rivers and smaller tributaries are susceptible to annual floods. (Yamhill County Emergency Management 2006)

The Willamette River has flooded on many occasions with the largest flood in 1861. In 1880 another large flood damaged the Yamhill River Bridge and washed out portions of the Willamette Valley Railroad's track. Flood control dams constructed in the 1940s and 1950s have changed the flooding pattern. There have been four major floods and several smaller floods in the last 40 years in Yamhill County: December 1955 and 1964, January 1965, 1972, 1974, and 1996, and November 1973. The largest and most damaging was the 1964 flood, which FEMA called a 100-year flood event. The most recent flood event occurred in December 2007.

- December 1964-January 1965. Two storm systems brought record rainfall to the region that had already experienced record, early season low-elevation snow. In Yamhill County, the flooding caused 10 deaths and hundreds of landslides, washed out roads and bridges, and damaged or destroyed houses. Thousands evacuated and the entire state was declared a disaster area.
- January 1974. Snowmelt caused by a series of storms combined with heavy snow and freezing rain to produce rapid runoff. Several roads were closed because of landslides and high water including some roads in Sheridan and Willamina. In several communities along the Willamette River, wastewater plants exceeding capacity discharged raw sewage into the river.
- February 1986. The flood was caused by heavy rains and snow melt. The Willamette River crested at 29 feet and was within inches of flooding. Homes were flooded and highways closed.
- February 1996. A series of floods were caused by deep snow pack, warm temperatures, and record breaking rain. The City of Carlton's wastewater treatment plant overflowed into the North Yamhill River. Total damages in the county exceeded \$4 million.
- November 1996. A warm weather system deposited heavy rain on the area causing flooding.

- January 1997. Heavy rains caused flooding throughout the county. Willamette River crested at 29 feet, one foot above flood level. The South Yamhill River at McMinnville crested at 55 feet, five feet above flood level. Five thousand residents lost power when high winds damaged power lines.
- December 2007. Severe storms, winds, mudslides, landslides, and flooding occurred between December 1 and 17, 2007 shutting down roads and highways including Interstate 5. Public infrastructure, homes, and personal property were damaged. In Oregon, 73,000 residents were without power, and wastewater treatment plants were overwhelmed. A major disaster was declared for the State of Oregon on December 8, 2007 with Yamhill County included in the declaration. (FEMA 2008) Yamhill County suffered the loss of the south approach fill at Ayers Creek Bridge on North Valley Road.

March 2008 FEMA disaster aid was estimated at approximately \$20 million as follows:

- ❖ \$6,051,729 in individual assistance approved
- ❖ \$10,957,500 in low-interest disaster loan assistance approved to homeowners, renters, and businesses of all sizes
- ❖ \$3,157,918 in public assistance obligated
- ❖ 3,569 individuals registered for assistance
- ❖ 3,864 individuals visited Disaster Recovery Centers
- ❖ 2,014 home inspections completed

5.3.1.3 Location

Yamhill County is in the Willamette River basin in northwestern Willamette Valley, and lies east of the Coast Range and west of the Cascade Mountain Range. Weather patterns generally move west to east where air masses from the Pacific Ocean rise over the Coast Range, cool, and become saturated. The Coast and Cascade ranges buffer the Willamette Valley from continental air moving westward. (Yamhill County Emergency Management 2006)

Yamhill County is subject to flooding from overflowing rivers (Willamette, North Yamhill, and South Yamhill) and smaller tributaries (Ayers, Panther, Turner, Haskins, Fairchild, Mill, Willamina, Rock, and Agency creeks), and flooding from local storm water drainage. Between October and April the county is susceptible to winter rain flooding, while between May and July, snowmelt and runoff can create floods. Typically, the most severe floods are winter rainfall floods in December, January, and February.

Figures K-3 through K-3J show the location of the 100 and 500-year floodplain in the county and each participation jurisdiction.

5.3.1.4 Extent

Floods can result in loss of life and property, with the extent of the damage dependant on the depth and velocity of the floodwaters. Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of

occurrence. Flood studies often use historical records, such as streamflow gauges, to determine the probability of occurrence for floods of different magnitudes.

FEMA has mapped most of the flood-prone streams in Oregon for 100- and 500-year flood events. A 100-year flood (1 percent probability of occurring within any given year) is used as the standard for floodplain management in the United States and is referred to as a base flood. Flood Insurance Rate Maps (FIRMs) prepared by FEMA provide the most readily available source of information for 100-year floods. These maps are used to support the NFIP. FIRMs delineate 100- and 500-year (2 percent probability of occurring within any given year) floodplain boundaries for identified flood hazards; these areas are Special Flood Hazard Areas (SFHAs) and provide the basis for flood insurance and floodplain management requirements.

For Yamhill County, there are 61 FIRMs for cities and communities in the unincorporated portions of the county. Major SFHAs identified within Yamhill County include:

Table 5-3. Yamhill County Flood Insurance Rate Maps

Flood Source	FIRM¹
Willamette River	410249 0195 C, 410249 0189 C, 410249 0187 C, 410249 0186 C, 410249 0188 C, 410249 0169 C, 410249 0335 C, 410249 0345 C, 410249 0510 C, 410249 0505 C
North Yamhill River	410249 0125 C, 410249 0130 C, 410249 0137 C, 410249 0141 C 410249 0145 C, 410249 0140 C, 410249 0306 C, 410249 0307 C
South Yamhill River	410249 0380 C, 410249 0385 C, 410249 0405 C, 410249 0428 C 410249 0429 C, 410249 0433 C, 410249 0431 C, 410249 0432 C 410249 0455 C, 410249 0460 C, 410249 0295 C, 410249 0315 C 410249 0320 C, 410249 0309 C, 410249 0308 C, 410249 0307 C 410249 0326 C, 410249 0327 C, 410249 0335 C
Ayers Creek	410249 0050 C, 410249 0065 C, 410249 0175 C
Panther Creek	410249 0125 C, 410249 0140 C, 410249 0145 C, 410249 0306 C
Turner Creek	410249 0025 C, 410249 0125 C
Haskins Creek	410249 0125 C
Fairchild Creek	410249 0025 C, 410249 0125 C
Mill Creek	410249 0433 C, 410249 0429 C
Willamina Creek	410249 0275 C, 410249 0250 C, 410249 0426 C, 410249 0428 C
Rock Creek	410249 0275 C, 410249 0427 C, 410249 0431 C
Agency Creek	410249 0225 C, 410249 0385 C, 410249 0405 C

¹FIRM = Flood Insurance Rate Map. The last effective date for these maps was 1983.

An area totaling 65.3 square miles within the county is within the 100-year floodplain and 69 square miles are within the 500-year floodplain. The 500-year event floodplain generally encompasses slightly more area than a 100-year event. Each watershed has its own water absorption characteristics. Buildings, roads, and parks replace grass and soil limiting water absorption. Therefore, 500-year events contain more water, which spreads further throughout the floodplain until the water can be managed by manmade and natural drainage systems.

Historic data indicates flood depths exceeding flood levels by one foot on the Willamette River (crested at 29 feet) and levels by five feet on the South Yamhill River (crested at 55 feet).

The FEMA-mapped floodplains in Yamhill County include, for the most part, only areas along the larger rivers and streams, which also have significant population and development. Other areas in the county have flood risk, but are not included in the FIRM because of small stream size or low population. Flood hazard evaluation for Yamhill County must also take into account these localized areas of high flood risk or repetitive flooding which lie outside mapped floodplains.

5.3.1.5 *Probability of Future Events*

Yamhill County is rated as having an above average flood risk. (State of Oregon 2008) Communities in Yamhill County participating in the NFIP are required to regulate floodplain development. Any structure built in the floodplain after 1974 has to meet NFIP requirements for elevation and flood proofing. FEMA has developed floodplain maps that are used as the basis for implementing floodplain regulations. FIRMS delineate flood hazard areas where NFIP regulations apply. FIRMS and flood insurance studies assess the probability of flooding at given locations. These maps represent a snapshot in time, and do not account for later changes which occurred in the floodplains. Development and other natural and artificial changes in the floodplain have caused changes to the rivers and streams in Yamhill County. For areas not mapped by FIRMS, flood-susceptible areas can be delineated and flood levels estimated by using historic stream flow records to determine flood frequency and recurrence.

Flood studies use this information to determine the probability of flood occurrence of different magnitudes. The probability of occurrence is expressed as a percentage indicating the probability of a specific flood event occurring in any given year.

Factors contributing to the frequency and severity of riverine flooding include:

- Rainfall intensity and duration
- Antecedent moisture conditions
- Watershed conditions, including steepness of terrain, soil types, amount and type of vegetation, and density of development
- The existence of attenuating features in the watershed, including natural features such as swamps and lakes, and human-built features such as dams
- The existence of flood control features, such as levees and flood control channels
- Velocity of flow
- Tide heights and storm surge
- Availability of sediment for transport, and the erodibility of the bed and banks of the watercourse

These factors are evaluated using a hydrologic analysis to determine the probability that discharge of a certain size will occur, and to determine the characteristics and depth of the flood resulting from that discharge.

Yamhill County has a wide range of climate and elevations with average monthly precipitation ranging from approximately fourteen inches in the highest elevations to five inches in lower

elevations. (ONHW 2006) Floods are most common in Yamhill County from October through April when storms from the Pacific Ocean brings intense rainfall. (Yamhill County Emergency Management 2006) Based on previous occurrences, flood events are likely around the county every one to ten years.

5.3.2 Winter Storm

Winter storms occurring in Yamhill County result in several natural hazards— including floods, landslides/debris flows, and wind. Each on its own, or in combination, can completely immobilize emergency response activities, close down transportation corridors, and disrupt transportation and utilities. Each of these natural hazards is individually discussed in detail in their respective sections.

Winter storms in Yamhill County can bring rain as well as snow, or can be followed by rising temperatures that melt newly fallen snow. Either scenario often causes flooding; most floods in western Oregon occur as a result of winter storms. The flood hazard is described in detail in flood section of this document.

As is the case with flood, wind as a hazard in Yamhill County most frequently occurs as part of a winter storm. The *nature, history, location, extent, and probability of future events* for wind, including winter storm wind, are explored in detail in the wind section of this plan.

5.3.2.1 Nature

Ice and snow storms, which can include freezing rain, sleet, and hail, can be the most devastating of winter weather phenomena and are often the cause of automobile accidents, power outages and personal injury. Ice storms result in the accumulation of ice from freezing rain which coats every surface it falls on with a glaze of ice. Freezing rain is most commonly found in a narrow band on the cold side of a warm front, where surface temperatures are at or just below freezing. Typically, ice crystals high in the atmosphere grow by collecting water vapor molecules, which are sometimes supplied by evaporating cloud droplets. As the ice crystals fall, the air warms and the particles melt and collapse into raindrops. As the raindrops approach the ground, they encounter a layer of cold air and cool to temperatures below freezing. However, since the cold layer is shallow, the drops themselves do not freeze, but rather are supercooled, that is cooled in a liquid state to below-freezing temperatures. These supercooled raindrops freeze on contact when they strike the ground or other cold surfaces.

Snowstorms happen when a mass of very cold air collides with a mass of warm air. The warm air rises quickly and the cold air cuts underneath it, cooling and condensing as it rises, forming a cloud bank in the process. As the moisture droplets in the cloud cool to a point below freezing, they become ice crystals, which then collide within the cloud and snow is formed. The resulting precipitation falls as snow only when the temperature of the air between the bottom of the cloud and the ground is below 40 degrees Fahrenheit. (ONHW 2006) A higher temperature will cause the snowflakes to melt as they fall through the air, turning them into rain or sleet. Similar to those of ice storms, the effects of a snowstorm can disturb a community for weeks or even months. The combination of heavy snowfall, high winds and cold temperatures poses danger from prolonged power outages, automobile accidents and transportation delays, dangerous walkways, and through direct damage to buildings, pipes, crops, other vegetation, and livestock. Buildings and trees can also collapse under the weight of heavy snow.

5.3.2.2 History

Table 5-4 summarizes the NOAA NWS Forecasts Offices past storm events website, which lists 12 significant ice and snow storms having occurred in Yamhill County since 1892.

Table 5-4. Ice and Snow Events, 1892 - 2007

Date	Storm Type	Details
December 1892	Snow	Large amounts of snow fell across all of northern Oregon, with accumulation ranging from 15 to 30 inches.
December 1919	Snow	Third largest snowstorm in Oregon history, freezing the Columbia River.
January-February 1937	Snow	More than 26 inches of snow fell over a five-day period.
January 1950	Snow	A total 39 inches of snow fell in the Salem area during the month of January.
March 1960	Snow	Heaviest snowfall accumulation since 1950.
January 1963	Snow and Ice	Four inches of snow and large amounts of ice recorded.
January 1978	Snow and Ice	Heavy snowfall.
February 1989	Snow	Storm resulted in 5-feet of snow drifts and single digit temperatures.
February 1993	Snow	Storm dropped 12 inches of snow in 24 hours.
February 1996	Ice	Freezing rain fell for 2 days.
December 2003-January 2004	Winter Storm	Both Polk and Yamhill counties federally declared disaster areas as a result of freezing rain.
December 2006	Winter Storm	Both Polk and Yamhill counties federally declared disaster areas as a result of freezing rain.
December 2007	Winter Storm	Severe storms resulted in flooding, landslides, and mudslides beginning on December 1, 2007 resulted in a major disaster declaration requiring over 20 million in aid. Five counties in Oregon were included in this disaster.

Source: (ONHW 2006)

5.3.2.3 Location

All areas of Yamhill County and participating jurisdictions can be affected by severe winter storms occurring between October and March that originate in the Gulf of Alaska or the central Pacific Ocean. Snow events can occur if a wet Pacific storm reaches the area when a cold air mass is present. Also, a natural break in the Cascade Mountains sometimes allows cold air from the east to funnel through the Columbia Gorge into the Portland area, which can eventually settle south to the Willamette Valley, and thus create snow and ice events. (ONHW 2006) Ice events include freezing rain, sleet, and hail.

Cold air rarely travels west of the Cascade Range, as the mountains provide a natural barrier separating the Willamette Valley from the cold air to the east. However, the Columbia River Gorge can provide a low-level passage funneling cold air westward. Rain, sleet, and/or snow

will fall if moisture-saturated warm air from the Pacific moves into the area colliding with the colder air mass.

5.3.2.4 Extent

Yamhill County is located in Climate Zone 2, generally consisting of wet winters and dry summers. Winter storm characteristics are determined by the amount and extent of ice and snow, air temperature, wind speed and wind direction. Winter storms can cause power outages, transportation and economic disruptions, injuries, and loss of life. Winter storms can also cause traffic related accidents and death, hypothermia, and heart attacks from snow shoveling. Emergency response times can be slowed because of icy road conditions. The weight of the snow or ice can cause utility disruption and falling trees and limbs. Snowmelt can cause flooding and landslides. (State of Oregon 2006)

5.3.2.5 Probability of Future Events

Historical data shows that the probability for annual winter storm recurrence is high with a one year recurrence interval. Winter storms combined with other weather events, like El Niño and La Niña cycle, often result in compounded hazards countywide. Winter storms have caused flooding, landslides, debris flows, utility and transportation systems disruptions.

5.3.3 Landslide

5.3.3.1 Nature

Landslide is a general term for the dislodgment and fall of a mass of soil or rocks along a sloped surface, or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rockfalls, rockslides, debris avalanches, debris slides and slump-earth flows. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation and weather.

Landslides can be triggered by natural events such as seismic tremors and earthquakes, volcanic eruptions, stream erosion, snowmelt, and prolonged or heavy rainfall. Development and other human activities can also provoke landslides. Increased runoff, excavation in hillsides, shocks and vibrations from construction, placement of non-engineered fill, and changes in vegetation from fire, timber harvesting and land clearing have all led to landslide events. Weathering and decomposition of geologic material, and alterations in flow of surface or ground water can further increase the potential for landslides.

The United States Geological Survey (USGS) identifies six types of landslides, distinguished by the type of material and movement mechanism involved:

- **Slides:** The more accurate and restrictive use of the term landslide refers to a mass movement of material, originating from a discrete area of weakness that slides from stable underlying material. A *rotational slide* occurs when there is movement along a concave surface; and a *translational slide* originates from movement along a flat surface.

- **Debris flows:** Flows arise from saturated material that generally moves rapidly down a slope. A debris flow usually mobilizes from other types of landslides on steep slopes, then flows through confined channels, liquefying and gaining speed. Debris flows can travel at speeds of more than 35 miles per hour for several miles. Other types of flows include debris avalanches, mudflows, creeps, earth flows, debris flows, and lahars.
- **Lateral Spreads:** This type of landslide generally occurs on gentle slopes or flat terrain. Lateral spreads are characterized by liquefaction of fine-grained soils. The event is typically triggered by an earthquake or human-caused rapid ground motion.
- **Falls:** Falls are the free-fall movement of rocks and boulders detached from steep slopes or cliffs.
- **Topples:** Topples are rocks and boulders that rotate forward and may become falls.
- **Complex:** Any combination of landslide types.

The likelihood of a landslide in any given slide-prone location is largely dependent on the water content of the soil or rock fill. Landslides may happen at any time of the year, especially during rainy months when soils become saturated with water. Earthquakes can add to slope stress and disrupt ground stability, thereby triggering landslides, usually in already slide-prone locations. In addition, unconsolidated deposits of alluvial and glacial outwash materials are subject to accelerated stream bank erosion and landslides.

Indicators of a possible landslide include:

- springs, seeps, or wet ground that is not typically wet;
- new cracks or bulges in the ground or pavement;
- soil subsiding from a foundation;
- secondary structures (decks, patios) tilting or moving away from main structures;
- broken water line or other underground utility;
- leaning structures that were previously straight;
- offset fence lines;
- sunken or dropped-down road beds;
- rapid increase in stream levels, sometimes with increased turbidity;
- rapid decrease in stream levels even though it is raining or has recently stopped; and
- sticking doors and windows, visible spaces indicating frames out of plumb.

Landslides often occur in conjunction with other natural hazards, thereby exacerbating conditions, as described below:

- Shaking due to earthquakes can trigger events ranging from rockfalls and topples to massive slides.
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides.

- Landslides into a reservoir can indirectly compromise dam safety, and a landslide can even affect the dam itself.
- Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential.

5.3.3.2 History

Oregon Department of Geology and Mineral Industries (DOGAMI) reports few landslides in Willamette Valley, however, southern Yamhill County and the edges of the valley are susceptible because of the occurrence of marine sedimentary rock and clay-rich residual soils overlying basalts. (ONHW 2006) Yamhill County does not have a comprehensive list of landslide events, but they likely occur during major storms in western Oregon. Major landslides were reported in 1964, 1966, 1982, and 1996 during storms. Two winter storms in November 1996 triggered over 9,500 landslides and debris flows on logged and un-logged land mostly in the Cascade and Oregon Coast mountain ranges. (ONHW 2006)

5.3.3.3 Location

In Yamhill County, DOGAMI reports the slopes nearest to the Willamette River, in the western portion of the Salem Hills, are at greatest risk of landslides. Weak, low-permeability marine sediments overlain by basalts, and clay rich residual soils overlying basalts are susceptible to water-induced landslides on steep slopes and within existing slide masses. Features such as “hummocky topography, disrupted drainage patterns, sag ponds, springs, back-tilted bedrock blocks, and subdued head scarps” are indicative of landslide terrain. (ONHW 2006)

Excavation and grading on sloping terrain and the addition of fill on slopes can increase the risk of landslides by affecting slope stability and angle. Alteration of drainage patterns causing water to flow over landslide prone slopes can trigger landslides. Likewise, broken pipes, leaking water or sewer lines, water retention facilities, irrigation, alterations to stream channels, stormwater management, increases in impervious surfaces and runoff can also increase landslide potential. Vegetation removal from steep slopes increases landslide potential. The Oregon Department of Forestry analyzed the storm impacts and landslides of 1996 and determined landslides increased during the ten years following timber harvesting.

Developments adjacent to the base of steep slopes, in confined stream channels (canyons), or on fans (rises) at stream channel mouths can be impacted by landslides. Excavating steep slopes, developing on gentle slopes, and on or adjacent to existing landslide prone areas can also put development sites at risk. Natural conditions such as rainfall, volcanic eruptions, or earthquakes can trigger landslides. (ONHW 2006) Figures K-4 through K-4I shows the landslide hazard areas.

5.3.3.4 Extent

The Oregon Department of Forestry (ODF) conducted a 3-year study of the impacts of landslides for two 1996 winter storms, entitled, *Storm Impacts and Landslides of 1996: Final Report*. This study concluded that the highest hazard for shallow rapid landslides in western Oregon occurs on slopes of over 70% to 80% steepness (depending on landform and geology).

The geographic extent of a landslide event is essentially the same as slide location, while the effects depend on what infrastructure is in the way of a slide, as well as the magnitude and force of the slide itself. The extent of effects could be as limited as one building or property, to region-wide effects, as in the case of a major transportation disruption, slide-induced dam failure, or utility outage.

Rapidly moving landslides have the greatest potential to endanger human life or inflict serious injury, especially to those living in or traveling through rapidly moving slide prone areas. Slow moving slides are less likely to inflict serious human injuries, but can cause property damage. (ONHW 2006)

5.3.3.5 Probability of Future Events

Some landslide activity can be expected annually during the rainy months, October through April. Previously saturated soils are prone to debris flows during periods of intense rainfall. Even though major property damage and other significant impacts from past landslide events have not been recorded for Yamhill County, it is important to map potential landslide and debris flow areas to prevent future losses. (ONHW 2006)

In general, the probability of slope failure increases with an increase in slope inclination. However, this is not always the case. Depending on various factors such as soil or rock type, water content, vegetative cover, slope aspect, permeability and rate of infiltration, proximity to seismic sources, magnitude of seismic events, and potential vertical and horizontal accelerations, a slope having a relatively low inclination could be at greater risk of failure than a slope having a relatively high inclination.

Landslides in western Oregon are generally a result of intense or prolonged rainfall, particularly during a rain on snow event. As such, based on previous occurrences, future widespread activity can be expected every 20 years and possibly more often depending on rain and storm events.

5.3.4 Wildfires

5.3.4.1 Nature

Wildfires can be classified as wildland fires, wildland/urban interface (or intermix) fires, urban fires, and prescribed fires. Both wildland fires and wildland/urban interface fires may occur in Yamhill County.

Wildland fires spread through the consumption of vegetation. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may be visible for miles around. Wildland fires can be caused by human activities such as arson or campfires, or by natural events like lightning. Wildland fires often occur in forests or other areas with ample vegetation. When a wildland fire spreads to developed areas such as suburbs, small communities, or isolated homes, it becomes a wildland/urban interface fire.

The following three factors contribute appreciably to wildland fire behavior and can be used to identify hazards.

- **Topography:** As slope increases, the rate of wildfire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridgetops can mark the end of a wildfire's spread, since fire spreads more slowly or may even be unable to spread downhill.
- **Fuel:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildfires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. The moisture content of both living and dead plant matter decreases during periods of prolonged drought and greatly increases the risk of fire. The fuel's continuity, both horizontally and vertically, is also an important factor. Forests with strong ladder fuels (understory growth between ground fuels and tree crowns) are more likely to have major fires involving tree crowns. Forests with limited ground fuels and little or no ladder fuels are much more likely to experience minor ground fires than a fire involving tree crowns. (ONHW 2006)
- **Weather:** The most variable factor affecting wildfire behavior is weather. Temperature, humidity, wind and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures coupled with low humidity, can lead to devastating wildfires. Conversely, cool temperatures and higher humidity often signal reduced wildfire occurrence and easier containment of existing fires.

In Yamhill County, wildland fires burn primarily vegetative fuels, outside highly urbanized areas. Wildland fires can be categorized as occurring in the following locations:

- **Agricultural:** Agricultural fires burn in areas where the primary fuels are flammable cultivated crops, such as wheat. This type of fire tends to spread very rapidly, but is relatively easy to suppress if adequate resources are available. Structures threatened, if any, are generally those belonging to ranch and farm owners. There can also be significant losses in agricultural products.
- **Forest:** Forest fires are the classic wildland fire. These fires burn fuels composed primarily of timber and associated fuels, such as brush, grass, logging residue and thick stands of replanted trees. Due to variations in fuel and topography, this type of fire may be extremely difficult and costly to suppress.
- **Wildland-Urban Interface:** Fires involving the wildland-urban interface occur in areas where urbanization and the presence of natural vegetation fuels allow a fire to spread rapidly from natural fuels to structures and vice versa. Especially in the early stage of such fires, structural fire suppression resources can be quickly overwhelmed, increasing the number of structures destroyed. Such fires are known for the large number of structures simultaneously exposed to fire. Nationally, wildland interface fires commonly produce widespread losses.
- **Urban:** While fires in urban areas rarely spread out of control, thanks to proximity to fire-fighting resources and less fuel between buildings, urban conflagration is a hazard in densely populated areas. Many of the same factors that influence hazard in wildland and interface areas come into play in urban centers. Drought, high temperatures, and fuel load are joined by factors such as flammable building materials, aging electrical

wiring, and closely packed structures to increase fire hazard. When combined with inadequate or faulty firefighting equipment, staff shortages, or poor location data, urban fire risk factors can set the stage for disaster.

Although thought of as a summer occurrence, wildland fires can, and do, occur during any month of the year. The vast majority of wildland fires occur between July and October. Dry spells during the winter months, especially when combined with the factors of winds or dead fuels, result in fires that burn with alarming intensity and rate of spread. Common causes of wildland fire include: lightning; equipment use; railroad activity; debris burning; arson; and improperly extinguished cigarettes.

Wildland fires are part of the natural ecology and natural life cycles of wildlands. Fires create open spaces with different habitats for both plants and animals than existed previously. Fires also reduce fuel loads in areas, which in turn decreases the potential for large catastrophic fires. (ONHW 2006) However, a wildland fire may grow into an emergency or disaster if not promptly controlled. Even a small fire can threaten lives and resources and destroy property, especially in heavily developed interface areas. Wildland fires may also harm livestock and pets. In addition to threatening humans, animals, and infrastructure, wildfires in forested areas have a severe impact on natural resources. Wildland fires strip the land of vegetation and destroy forest resources. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thus increasing flood potential, harming aquatic life and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards, as discussed in the landslides hazard profile.

5.3.4.2 History

Wildland fires have burned the Oregon landscape for thousands of years. Many wildfires have resulted from natural lightning strikes and intentional human activities. In Yamhill County, the indigenous Che-ahm-ill people, a subgroup of the Kalapuyan culture, purposely ignited large portions of the basin valley annually for agriculture, hunting, communication, warfare, visibility, safety, and sanitation. The Kalapuyans occupied the Yamhill basin valley at the time of Euro-American contact, but such systemic burning may have been used for as long as ten thousand years prior to Euro-American settlement. Euro-American settlement in the mid-19th century continued to shape the landscape with fire. Euro-Americans burned land to protect timber and property in the region. Euro-Americans directed more attention to forested areas and coastland. As a result, valley prairies and savannas burned less and areas that were not used for fields or pastures began growing into forests. (ONHW 2006)

According to ODF, major wildfires have occurred in Oregon in the past 150 years, with several occurring in Yamhill County (Table 5-5).

Table 5-5. Historic Fires in Oregon (1848-2008)

Year	Name of Fire	Counties	Acres burned
1848	Nestucca	Tillamook/Yamhill	290,000
1849	Siletz	Lincoln/Polk	800,000
1853	Yaquina	Lincoln	480,000
1865	Silverton	Marion	988,000
1868	Coos Bay	Coos	296,000

Table 5-5. Historic Fires in Oregon (1848-2008)

Year	Name of Fire	Counties	Acres burned
1933	Tillamook	Tillamook/Yamhill	190,000
1936	Bandon	Coos	143,000
1939	Saddle Mountain	Tillamook/Yamhill	190,000
1945	Wilson River/Salmonberry	Tillamook	182,000
1951	North Fork & Elkhorn	Tillamook, Yamhill	33,000
1966	Oxbow	Lane	44,000
1987	Silver	Josephine	97,000
1992	Lone Pine	Klamath	31,000
1996	Skelton	Deschutes	17,700
2002	Biscuit	Josephine/Curry	500,000
2003	B&B Complex	Jefferson/Linn/Deschutes/Marion	80,000
2005	Blossom Complex	Curry	14,772
2006	Shake Table Complex	Grant	14,453
2007	Lovelett Creek	Grant	53,556
2007	Battle Creek Complex	Wallowa	79,299
2007	Irish Springs (Vale BLM)	Baker	45,743
2007	Egley Complex	Harney	140,360

The 1933 Tillamook valley fire ravaged nearly a quarter of a million acres and is thought to have caused several localized burns in the Willamina watershed.

As shown in Figure K-5, between 1962 and 2004, only two state-reported fires larger than 1,000 acres burned in the region.

Yamhill County also has a growing history of wildland/urban interface fires. With suburban growth in the early 1970s, increasingly wildland fires in the area have affected or involved homes. In the 1990s, more than 100 structures burned in wildland fires and thousands more were threatened. (ONHW 2006) Throughout the country, decades of strict fire suppression have resulted in thick overgrown forests that are highly vulnerable to even small fires in dry windy conditions.

5.3.4.3 Location

The Oregon Department of Forestry has developed a list of high-risk wildland fire communities. High-risk communities are defined as those that have at least 28 persons per square mile within 5 miles of a high-risk watershed. No communities within Yamhill County are included on this list.

However, as shown on Figures K-6 through K-6J, there are a few areas within the county that are at moderate and high risk for wildland fires. In general, steep, south-facing sloped forested areas are considered to be most at risk for wildland fires while flat, north-facing developed or wetland areas are considered to be at least risk for wildland fires. As such, the urbanized areas of Willamina, McMinnville, Dundee, and Newberg are at low risk for wildland fires. The evergreen and deciduous forests that border all sides of the county are at moderate risk for a wildland fire.

Furthermore, the 2001 Federal Register lists some Yamhill County communities at risk from wildfire damage. In Yamhill County, fire hazards are likely due to a lack of firebreaks around

buildings, limited water during summer months, and fire suppression practices over the last 100 years. (ONHW 2006)

5.3.4.4 Extent

The magnitude of wildfires is primarily dependent on severe drought coupled with lightning strikes and windy, stormy conditions, and the effects of wildfire suppression. For example, wildfire suppression has changed the vegetation of the Willamette Valley, which in turn has made some areas more susceptible to wild fires. The Willamette Valley was originally covered by lowland evergreen and deciduous forests and native prairie grasslands. Now there is more brush, small diameter trees, Douglas fir, and more crops, such as wheat, which can increase potential for wildfire damage.

Impacts of a wildland fire that interfaces with the population of Yamhill County could grow into an emergency or disaster if not properly controlled. A small fire can threaten lives and resources and destroy property. In addition to impacting human lives, wildland fires may severely impact livestock and pets. Such events may require emergency watering and feeding, evacuation and alternative shelter. (ONHW 2006)

5.3.4.5 Probability of Future Events

In Oregon, wildland fire season normally begins in late June, peaks in August, and ends in October. However, a combination of above normal-temperatures and drought can increase the length of the traditional fire season. Wildland fires are not common in the Willamette Valley and based on historic events, large fires (1,000-acres) are only likely to occur every 20 years.

Urban fires are the most preventable type of fire, and future events depend largely on prevention measures. Although no historical urban conflagrations in have occurred, educating residents, building and maintenance code enforcement, and firefighting equipment, staff, and response systems upkeep are all steps that can ensure that highly likely localized urban fires do not become large-scale conflagrations.

5.3.5 Earthquake

5.3.5.1 Nature

An earthquake is a sudden motion or trembling of the earth produced by the rupture of rocks due to stresses beyond the rocks' elastic limits. The point inside the Earth where the rupture takes place is termed the hypocenter. The point on the planet's surface directly above the hypocenter is the epicenter. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, or the vibration or shaking of the ground during an earthquake.

The severity of ground motion generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. Ground motion causes waves in the earth's interior, also known as seismic waves, and along the earth's surface, known as surface waves. There are two kinds of seismic waves. P (primary) waves are

longitudinal or compression waves similar in character to sound waves, that cause back-and-forth oscillation along the direction of travel (vertical motion). S (secondary) waves, also known as shear waves, are slower than P waves and cause structures to vibrate from side to side (horizontal motion). When P and S waves hit the surface of the Earth, they generate surface waves, which are further categorized into Raleigh waves and Love waves. Slower than seismic waves, and therefore later to hit, surface waves are responsible for most of the damage during an earthquake.

Earthquakes are usually measured in terms of magnitude (M) and intensity. Magnitude is related to the amount of energy released during an event, while intensity refers to the effects on people and structures at a particular place. Small to moderate earthquake magnitude is usually reported according to the standard Richter scale. Larger earthquakes are reported according to the moment-magnitude scale because the standard Richter scale does not adequately represent the energy released by these large events.

Intensity is usually reported using the Modified Mercalli (MM) Intensity Scale. This scale has 12 categories ranging from “not felt” to “total destruction.” Different values can be recorded at different locations for the same event depending on local circumstances such as distance from the epicenter or building construction practices. Peak ground acceleration (PGA) is also used to measure earthquake intensity. It measures the earthquake’s intensity by quantifying how hard the earth shakes in a given location. PGA can be measured in g, which is acceleration due to gravity. Table 5-6 identifies corresponding intensity and magnitude ratings as well as effects associated with each rating.

Table 5-6. Effects of Intensity and Magnitude Ratings

Magnitude	MM Intensity	PGA (% g)	Perceived Shaking
0-4.3	I	<0.17	Not Felt
	II-III	0.17-1.4	Weak
4.3-4.8	IV	1.4--3.9	Light
	V	3.9-9.2	Moderate
4.8-6.2	VI	9.2-18	Strong
	VII	18-34	Very Strong
6.2-7.3	VIII	34-65	Severe
	IX	65-124	Violent
	X	124 +	Extreme

In addition to ground motion, several secondary hazards can occur from earthquakes, such as surface faulting. Surface faulting is the differential movement of two sides of a fault at the earth’s surface. Displacement along faults, both in terms of length and width, varies but can be significant (up to 20 feet), as can the length of the surface rupture (up to 200 miles). Surface faulting can cause severe damage to linear structures, such as railways, highways, pipelines and tunnels.

Earthquake-related ground failure due to liquefaction is another secondary hazard. Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its structure, and causing some of the empty spaces between granules to collapse. Pore-water pressure may also increase sufficiently to cause the soil to briefly become fluid. Liquefaction causes lateral

spreads (horizontal movements of commonly 10 to 15 feet, but up to 100 feet), flow failures (massive flows of soil, typically hundreds of feet, but up to 12 miles) and loss of bearing strength (soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property.

The most common earthquakes that occur in Oregon are crustal, intraplate or great subduction earthquakes. Yamhill County is most susceptible to deep intraplate and subduction zone earthquakes. (ONHW 2006) These are described as follows:

Crustal earthquakes: These generally occur along shallow faults near the earth's surface. Crustal earthquakes make up the majority of earthquakes in the Cascadia area (western Washington, Oregon and northwestern California) and are a result of fault movement in the Earth's surface. These shallow earthquakes are usually less than 7.5 magnitude and strong shaking generally lasts 20 to 60 seconds. Aftershocks, as well as tsunamis and landslides, are anticipated after a crustal event. The Mount Angel Fault is located approximately 15 miles from Yamhill County, and is responsible for the 5.7 magnitude Spring Break Quake in 1993. (ONHW 2006)

Intraplate earthquakes: These occur deeper, at 20 to 40 miles beneath the ground surface. These deep earthquakes are usually less than 7.5 magnitude, and damaging events occur every 10 to 30 years in this region. There are few aftershocks, and tsunamis are generally not anticipated, although landslides can trigger localized tsunamis. Due to the deep earth movement, an intraplate earthquake is felt over a larger area with less intensity. Damage from this type of event is generally less than with an equally sized crustal earthquake.

Great subduction earthquakes: occur offshore of the Oregon and Washington Coasts along the Cascadia Subduction Zone. This zone is the result of the Juan de Fuca plate being pushed under the North American plate. Earthquakes centered along this zone can be as great as 9.0 magnitude. Geologic evidence demonstrates approximately 500 years between events with the last significant event on January 26, 1700. Aftershocks up to 7.0 magnitude are anticipated to cause additional damage. Liquefaction, tsunamis and landslides are expected as a result of a great subduction earthquake.

5.3.5.2 History

Approximately 7,000 earthquakes in the Pacific Northwest have been documented over the past 200 years. This documentation has occurred sporadically, with only the most significant events being recorded until recent history. More than 6,000 earthquakes have been recorded in Oregon since 1841. Many earthquakes were documented as below a magnitude three. The University of Washington expanded its seismograph coverage of Yamhill County and northwestern Oregon in 1980. (ONHW 2006)

Currently, the University of Washington seismology laboratory records approximately 1,000 earthquakes of magnitude 1.0 or greater annually in Washington and Oregon. While most of these events are barely felt, anywhere from 12 to 24 earthquakes cause enough ground shaking to be recognized as an actual earthquake by area residents. Table 5-7 shows magnitude 4.0 or greater earthquakes affecting the planning area since 1949. Figure K-7 shows historic earthquakes affecting the region from 1840-2006.

- The February 28, 2001 Nisqually earthquake caused evacuations in Yamhill County and Willamette Valley, and damage was reported to the Dundee Fire Hall.
- The Scott Mills earthquake cause bricks to fall from an un-reinforced masonry building in Dayton and approximately 90 buildings were damaged in Newberg. The Dayton Bridge on Highway 18 was closed for structural damage. The Highway 18 at Highway 99 West was closed and Portland General Electric reported power outages to customers in Dundee. (ONHW 2006)

Table 5-7. Magnitude 4.0 or Greater Earthquakes, 1941 - 2006

Date	Magnitude	Location	Approximate Distance to Planning Area
1941	7.1		
April 13, 1949	7.1	Olympia, WA	150 miles
April 18, 1961	4.5	Albany, OR	40 miles
1962	5.2		
November 5, 1962	5.5	Vancouver, WA	65 miles
March 7, 1963	4.6	Salem, OR	25 miles
March 25, 1993	5.6	Scotts Mills, OR	45 miles
February 28, 2001	6.8	Anderson Island, WA	150 miles

5.3.5.3 Location

Yamhill County is located within the geographical area bordering the Cascadia Subduction Zone. This zone is comprised of an 800-mile sloping fault and several smaller offshore faults located west of the Pacific Coast, from British Columbia to the north and Northern California to the south. The fault system separates the Juan de Fuca and North American plates. A series of inferred faults, faults extending underground from a visible fault, and concealed faults are present near Dayton, south of McMinnville. (ONHW 2006)

Inland, there are nine faults located within the USGS Quaternary Fault and Fold Database for the Salem 1° x 2° Sheet (44° - 45° by 124° - 122°), including the Portland Hills Fault, East Bank Fault, and Mount Angel Fault. Major offshore and onshore faults are shown in Figure K-8.

Shaking hazard maps produced by the United States Geological Survey (USGS) consider two alternative scenarios for damaging earthquakes (M 8.3 or M 9.0) along the subduction zone. The shaking hazard maps show the level of ground motion that has 1 chance in 475 of being exceeded each year, which is equal to a 10 percent probability of being exceeded in 50 years. As such, as shown in Figures K-9 and K-10, the planning area falls within the strong to very strong shaking range (9-25 percent of acceleration of gravity). All of Yamhill County may be subject to an earthquake. However, the western portion of Yamhill County is more likely to be more affected by a major quake, because of closer proximity to the Cascadia Subduction Zone.

5.3.5.4 Extent

The extent of earthquake effects depends on the nature, magnitude, and location of the quake. An earthquake can be anything from a tiny tremor affecting only a very localized area, to a

major shake that affects an entire region. It is expected that earthquakes in Yamhill County would affect water and sewer systems, natural gas lines, and power/electrical systems. For hazard mitigation purposes, it should be considered that the extent of a major event would be greater than county-wide.

5.3.5.5 Probability of Future Events

Oregon ranks third for future earthquake damages, with losses of exceeding \$12 billion in an 8.5 magnitude Cascadia Subduction Zone earthquake. Recent research shows the Cascadia Subduction Zone is capable of producing a 9 M earthquake. The risk of damage to structures and human life is greater today because of the increase in population. Many of the older structures and utility infrastructures were not designed to withstand an earthquake. (ONHW 2006)

Geological evidence indicates that damaging earthquakes (M 8.0 to M 9.0) may have occurred at least seven times in the last 3,500 years, suggesting a return time of 300 to 600 years. While it is impossible to predict when an earthquake may occur, it is highly probable (1 event in 35 years) that a moderate earthquake (M 4.0 and greater) will occur along the Cascadia Subduction Zone, thereby affecting Yamhill County.

5.3.6 Volcano

5.3.6.1 Nature

A volcano is a vent or opening in the earth's crust from which molten lava (magma), pyroclastic materials, and volcanic gases are expelled onto the surface. Volcanoes and other volcanic phenomena can unleash cataclysmic destructive power greater than nuclear bombs, and can pose serious hazards if they occur in populated and/or cultivated regions. Ashfall, and tephra, an eruptive hazard, are of the greatest concern in Yamhill County.

There are four general types of volcanoes found within a short distance of Yamhill County:

- **Lava domes** are domes that are formed when lava erupts and accumulates near the vent.
- **Cinder cones** are cone-shaped and formed by accumulation of cinders, ash, and other fragmented materials originating from an eruption.
- **Shield volcanoes** are broad, gently sloping volcanic cones of flat domical shape, usually several tens or hundreds of square miles in extent, built chiefly of overlapping and interfingering basaltic lava flows.
- **Composite or stratovolcanoes** are typically steep-sided, symmetrical cones of large dimensions built of alternating layers of lava flows, volcanic ash, cinders, and blocks. Most composite volcanoes have a crater at the summit containing a central vent or clustered group of vents.

Along with the different kinds of volcanoes, there are different types of eruptions. Eruption type is a major determinant of the physical results it creates and the hazards it poses. Six main types of volcano hazards exist:

- **Volcanic gases** are made up of water vapor (steam), carbon dioxide, ammonia, as well as sulfur, chlorine, fluorine, boron, and several other compounds. Wind is the primary source of dispersion for volcanic gases. Life, health, and property can be endangered from volcanic gases within about six miles of a volcano. Acids, ammonia, and other compounds present in volcanic gases can damage eyes and respiratory systems, and heavier-than-air gases, such as carbon dioxide, can accumulate in closed depressions and suffocate humans and animals.
- **Lahars** are formed when loose masses of unconsolidated, wet debris become mobilized, and are usually created by shield volcanoes and stratovolcanoes. Eruptions may trigger one or more lahar directly by quickly melting snow and ice on a volcano or ejecting water from a crater lake. More often, lahars are formed by intense rainfall during or after an eruption. Rainwater can easily erode loose volcanic rock and soil on hillsides and in river valleys. As a lahar moves farther away from a volcano, it will eventually begin to lose its heavy load of sediment and decrease in size.
- **Landslides** are common on stratovolcanoes because their massive cones typically rise thousands of feet above the surrounding terrain, and are often weakened by the very process that created the mountain—the rise and eruption of molten rock (magma). If the moving rock debris is large enough and contains a large content of water and soil material, the landslide may transform into a lahar and flow more than 50 miles from the volcano.
- **Lava flows** are streams of molten rock that erupt from a vent and move down slope. Lava flows destroy everything in their path. However, deaths caused directly by lava flows are uncommon because most move slowly, and flows usually do not travel far from the source vent. Lava flows can bury homes and agricultural land under hardened rock, obscuring landmarks and property lines.
- **Pyroclastic flows** are dense mixtures of hot, dry rock fragments and gases that can reach 50 miles per hour (mph). Most pyroclastic flows include a ground flow composed of coarse fragments and an ash cloud that can travel by wind. Escape from a pyroclastic flow is unlikely because of the speed at which they move.
- **Tephra** is a term describing any size of volcanic rock or lava that is expelled from a volcano during an eruption. Large fragments generally fall back close to the erupting vent, while particles of ash can be carried hundreds to thousands of miles away from the source by wind. Ash clouds are common adaptations of tephra.

5.3.6.2 History

Cascade volcanoes that have erupted during the past 4,000 years include Mount Baker, Mount Rainier, Mount St. Helens, Mount Adams, Mount Hood, Three Sisters, Newberry Volcano, Mount Mazama (Crater Lake), Medicine Lake Volcano, Mount Shasta, and Lassen Peak (Figure K-11).

The closest volcanoes to Yamhill County are Mount St. Helens, Mount Jefferson and Mount Hood, all to the east.

Mount St. Helens has been the most active volcano in the Cascade Range during the past 10,000 years. In Oregon, awareness of the potential for volcanic eruptions was greatly increased by the May 18, 1980 eruption of nearby Mount St. Helens in Washington which killed 57 people. The upper portion of the summit collapsed in a massive landslide triggered by volcanic tremors. That portion of the mountain is now a horseshoe-shaped crater partially filled by a lava dome. Early 19th Century settlers in the region witnessed eruptions occurring along the north flank area of the mountain.

As a result of the 1980 eruption and the far-reaching extent of the lateral blast, damage and reconstruction exceeded \$1 billion. The coverage area was 230 square miles and reached 17 miles northwest of the crater. Impacts from pyroclastic flows covered six square miles and reached 5 miles north of the crater, and landslides covered 23 square miles. Lahars (mudflows) affected the North and South Forks of the Toutle River, the Green River, and ultimately the Columbia River as far as 70 miles from the volcano.

Mount St Helens' most recent eruption began in October of 2004, with initial steam and ash eruptions giving away to slow-moving lava flows which ceased in January of 2008.

Mount Hood erupted in approximately 1805. Two other minor eruption periods occurred during the last 500 years with some lava flow near the summit. The eruptions created pyroclastic flows and lahars with little ash fall. (State Interagency Hazard Mitigation Team 2006) The other volcanoes in the Pacific Northwest have undergone similar formation and eruption cycles.

Mount Jefferson last erupted about 15,000 years ago. Research of other stratovolcanoes suggest that Mount Jefferson should be considered dormant, not extinct. A major eruption could generate pyroclastic flows and lahars, and an explosive eruption could spew ash for hundreds of miles downwind. The volcano has steep slopes and debris flows would likely be contained in within 10 miles of the surrounding valley. (ONHW 2006)

5.3.6.3 Location

The extensive north-south oriented chain of volcanoes known as the Cascadia volcanic arc, or Cascade Range, were formed by the Cascadia subduction zone. As the seafloor plate sinks beneath the North American Plate, it heats up and begins to melt, providing a vast reservoir of the heat and molten rock that create the magma chambers that become volcanoes.

Three closest three volcanoes to Yamhill County, Mount St. Helens, Mount Hood, and Mount Jefferson, all lie to the east.

- **Mount St. Helens**, a stratovolcano, is located approximately 50 miles northeast of Portland in Skamania County and has an elevation of 9,677 feet. Access is provided from the west in Cowlitz County by State Route 504 about 34 miles west of Interstate Highway 34. (USGS 2008)
- **Mount Hood** is located approximately 47 miles east-southeast of Portland and is the most accessible of Oregon's volcanoes. Access to the volcano is provided by US Highway 26 from the south and Oregon Highway 35 from the east side. Other paved roads provide further access to this most often climbed peak in the Pacific Northwest. A hiking trail circles the volcano. In the winter, the mountain hosts downhill and cross

county skiing. At 11,239 feet, Mount Hood is the highest peak in the state and is part of the Mount Hood National Forest. (USGS 2008)

- **Mount Jefferson** is located in the Mount Jefferson Wilderness area and the Warm Springs Indian Reservation approximately 70 miles from Portland, and 50 miles from Bend, Oregon. Access is provided by Highway 22 east of Salem and US Forest Service roads and trails lead into the wilderness area. (USGS 2008)

5.3.6.4 Extent

Mount St. Helens, a stratovolcano, is believed to be the volcano with the greatest potential to have a near-term impact on the region because of its ongoing activity since the cataclysmic event in May 1980. A large eruption of Mount St. Helens can eject tephra to altitudes of 12 to 20 miles and to deposit tephra over an area of 40,000 square miles or more. Wind direction and velocity, along with the vigor and duration of the eruption, will control the location, size, and shape of the area affected by tephra fall. Another eruption from Mount St. Helens is likely in the near future.

Mount St. Helens most recently erupted in October of 2004, pushing ash more than 10,000 ft into the air, and lava flows continued until January, 2008, after which activity ceased. The volcano has been recently downgraded to inactive, although another eruption in the near future is highly likely.

Due to proximity, the major hazard for Yamhill County would be impacts from ash (i.e., minor ash falls from eruptions from Mount St. Helens (or lesser ash falls from more distant volcanoes). Prevailing wind is a factor in how much ash is disbursed among communities within Yamhill County. Volcanic eruptions may impact water bodies. River valleys are susceptible to debris flows, landslides, and lahars; this may require dredging to maintain channel depths for navigation.

Buildings, streets, and roads throughout the entire county would require minor cleanup with negligible impacts. Temporary utility interruptions are likely, and minor cleanup may be required for electrical and other utility services. Water treatment facilities may require additional attention to address high turbidity water. Injuries associated with respiratory problems may result. (Goettel 2005)

5.3.6.5 Probability of Future Events

Yamhill County has a low risk of experiencing damage from a volcano. Ashfall is of greatest concern in the county. The USGS estimates there is annual probability of 0.01 percent that 10 centimeters or more of tephra (ash) accumulation will occur in the far west portions of Yamhill County. Most of the county has less than 0.01 percent probability of ash fall impact. Ashfall deposition is controlled by prevailing wind direction, which in the Cascades is predominately from the west. During previous eruptions, ash fall has drifted to the east of the volcanoes. (ONHW 2006)

By careful analysis of past activity, geologists can make general forecasts of long-term activity associated with individual volcanoes, but these are on the order of trends and likelihood, rather than specific events or timeline. Short-range forecasts are often possible with greater accuracy. Several signs of increasing activity can indicate that an eruption will follow within weeks or

months. Magma moving upward into a volcano often causes a significant increase in small, localized earthquakes, and increased emissions of carbon dioxide and compounds of sulfur and chlorine that can be measured. Shifts in magma depth and location can cause changes in ground level elevation that can be detected through ground instrumentation or remote sensing.

The USGS has identified several other potentially active volcanoes in Washington, Oregon, and California. The effects of volcanic activity from these volcanoes could include landslide avalanches, lahars, tephra, lava, and pyroclastic flows or surges. Activity from one of these volcanoes is highly likely in the near future.

5.3.7 Wind

5.3.7.1 Nature

Wind is air flow that travels horizontally with respect to the Earth's surface and topography. High winds are defined as those that last longer than one hour at greater than 39 miles per hour (mph) or for any length of time at greater than 57 mph. Wind speeds vary with individual storms. Windstorms often accompany snow, ice, and extreme cold temperature events during winter storms.

In general, the damaging effects of windstorms may extend for distances of 100 to 300 miles from the center of storm activity. Tornadoes are the most violent and destructive type of windstorm, usually caused by thunderstorms. (Taylor et al. 1996) A tornado is a rotating column of air in contact with both a cloud base and the ground. (AMS 2000) Wind speeds can exceed 300 to 400 mph leaving widespread destruction in their paths. While tornadoes are most common in the Midwest, they have occurred in Oregon. (ONHW 2006) Oregon ranks 46th for frequency of tornados. Historically, Yamhill County has experienced five tornadoes.

5.3.7.2 History

Numerous damaging windstorms have occurred within Yamhill County. Table 5-8, includes some of the most noteworthy that brought extensive damage to the region.

Table 5-8. Windstorm Events, 1926 - 2008

Date	Sustained Wind Speed	Details
February 19, 1926		Tornado. Tree damage was reported.
April 1931	40 mph (75 mph gusts)	The wind caused multiple wildfires in the Willamette Valley, and dust clouds reduced visibility (Oregon Statesman. April 22, 1931).
November 10–11, 1951	40-50 mph (75-80 mph gusts)	Damage experienced statewide.
December 1951	60 mph (75 mph gusts)	Winds damaged buildings and utility lines statewide, four fatalities (Oregon Statesman. December 5, 1951).
December 1955	55-65 mph	In addition to extensive damage to buildings, power and telephone lines throughout the state, heavy destruction occurred in the Willamette Valley orchards.
November 1958	51 mph (71 mph gusts)	Fallen trees blocked highway access.

Table 5-8. Windstorm Events, 1926 - 2008

Date	Sustained Wind Speed	Details
October 12, 1962	62 mph (90 mph wind gusts)	The Columbus Day storm was the equivalent of a Category IV hurricane in terms of central pressures and wind speeds. The storm, which started east of the Philippines as Typhoon Freda, measured 1,000 miles long as it hit the West Coast. The damage to Yamhill County was estimated to be over \$15 million. Extensive damage occurred to farm buildings and tree farms. Thirty-eight fatalities were recorded in Willamette Valley (News Register 1962).
March 1971	50 mph	Falling trees damaged homes and utilities. Most of the state was affected by the windstorm, but the worst damage occurred in Willamette Valley.
May 25, 1971	40-72 mph	Tornado. Limited damage (\$500-\$5000).
August 20, 1978		Tornado. Limited damage (\$5000-\$50,000).
November 13 –14, 1981	52 mph (71 mph gusts)	Strongest windstorm since the Columbus Day storm. Widespread power outages and roof damage occurred. Eleven fatalities resulted from storm.
April 18, 1984		Tornado. Limited damage (\$500-\$5000).
January 1990	75 mph	Damage experienced statewide, one fatality.
December 8, 1993	113-157 mph	Tornado. Considerable damage resulted (\$500,000-\$5 million).
December 12, 1995	62 mph	Very wet soil from an unusually rainy fall resulted in the toppling of many trees in the Willamette Valley. Three fatalities occurred, as well as over \$1 million in damages to the mid-Willamette Valley (Statesman Journal 1995).
November 1997	52 mph	Trees uprooted.
February 7–8, 2002	70 mph	Resulted in a Presidential declaration for coastal counties south of Polk and Yamhill counties.

Source: Taylor, George H., and Ray Hatton, The Oregon Weather Book (1999), pp.151-157
Hazard Mitigation Team Survey Report, Severe Windstorm in Western Oregon, February 7, 2002 (FEMA-1405-DR-OR)
ONHW 2006

5.3.7.3 Location

Yamhill County in the Willamette Valley is somewhat sheltered from strong westerly winds, as the north-south orientation of the Coast Range and Cascades obstructs and slows down these surface winds. The north-south orientation of the Willamette Valley often channels the winds in a north south direction. (ONHW 2006) Winds blowing along a north to south axis, parallel to the major mountain ranges, can prove to be extremely destructive. Regardless of wind direction, prolonged windstorms are likely to last an average of three to six hours before moving on.

Most frequently, surface winds are from the southeast and are associated with storms moving in from the Pacific Ocean. Winds out of the south are generally more destructive. Chinook winds are strong easterly, warm, dry winds that come out of the Columbia River Gorge and can gust up to 100 mph. Chinook winds are caused by rapid atmospheric pressure changes. Prevailing winds vary with the seasons. Local topography plays a part in wind direction. (ONHW 2006)

5.3.7.4 Extent

High winds are likely to occur during the months of October through April. Destructive windstorms are less frequent, but recent research has revealed a connection between the neutral years of the El Niño Southern Oscillation conditions and major Pacific Northwest windstorms. Generally, windstorms have a short duration and winds move in a straight line with gust exceeding 50 mph. (ONHW 2006) Damaging winds can extend for 100 to 300 miles from the center of a storm. (State Interagency Hazard Mitigation Team 2006)

Tornados are characterized by wind speed and duration. Typically, they can last between several minutes to several hours, and can travel miles. The width of their paths varied between 10 feet and over one mile. (ONHW 2006) The low-pressure centers bring sustained winds (40-60 mph) strong enough to topple power lines and trees.

5.3.7.5 Probability of Future Events

The risk of experiencing a windstorm in Yamhill County is low. There is four percent probability of experiencing a 25-year event with winds of 60 mph. There is a two percent annual probability of experiencing a 50-year event with winds of 67 mph, and a one percent annual probability of experiencing a 100-year event with winds of 75 mph. (State Interagency Hazard Mitigation Team 2006)

Each winter, several Pacific low pressure centers make landfall in the northwest, bringing sustained winds strong enough (40-60 mph) to topple power lines and trees. Less frequently (one to two times every ten years), storms of considerably greater magnitude can produce winds gusting up to 70 mph or greater. The typical windstorm pattern in this area is a southwesterly flow as air heads directly into the Pacific Northwest.

The preliminary research shows that El Niño events tend to shear weather systems apart as they approach the Northwest and La Niña events tend to have periods with enhanced high pressure, thereby producing enhanced cool, northerly flows. The wind-producing intervening neutral years tend to occur every 3-7 years.

5.3.8 Erosion

5.3.8.1 Nature

Erosion is a process that involves the gradual wearing away, transport, and movement of land. However, not all erosion is gradual. It can occur quite quickly as the result of a flash flood, coastal storm, or other event. Most of the geomorphic change that occurs in a river system is in response to a peak flow event. It is a natural process but its effects can be exacerbated by human activity.

Erosion is a problem in developed areas where the disappearing land threatens development and infrastructure. There are three main types of erosion that affect human activity in Oregon.

- ❑ **Coastal erosion** is the wearing away of land and loss of beach, shoreline, or dune material because of natural activity or man-made influences. It can occur gradually or

suddenly. Usually erosion is a long-term process, but it can also happen quickly during storm events.

- ❑ **Wind erosion** occurs when wind removes, moves, and redeposits soil. It can cause a loss of topsoil, hindering agricultural production. Blowing dust can also reduce visibility and have a negative effect on air quality.
- ❑ **Riverine erosion** results from the force of flowing water in, and adjacent to, river, creek, and tributary channels. This erosion affects the bed and banks of the channel and can alter or preclude any channel navigation or embankment development. In less stable braided channel reaches, erosion and material deposition are a constant issue. In more stable meandering channels, episodes of erosion may only occur occasionally.

Various communities along the rivers, creeks, and tributaries in Yamhill County have identified riverine erosion as a threat to their community. Erosion of any type rarely causes death or injury. However, erosion can cause significant destruction to property and infrastructure.

Generally erosion occurs when the flow of the river changes and is directed towards the banks or mid-channel islands. These changes can be caused by surface wind stress and gravity waves that occur during storm events (primarily severe winter storms), transporting sediment by bottom currents. (Sternberg 1986)

5.3.8.2 *History*

The following descriptions provide a brief overview of historic erosion events in Yamhill County.

- Riverine erosion in local creeks occurred with minimal damage with culverts being filled and backed up during the 1964 flood event.
- The City of Willamina has lost 20 feet of embankment from Willamina Creek and has experienced erosion along the Yamhill River.

5.3.8.3 *Location*

Erosion loss has historically occurred in Yamhill County from landslides, stream bank failures, and agricultural activities. All rivers and creeks are subject to erosion. Yamhill County has approximately 113 rivers and creeks. Some of those potentially threatened by erosion include the Willamette, Wind, and North and South Yamhill Rivers; and Ash, Berry, Baker, Fairchild, Maroney, Perkins, Turner, Petch, Panther, and Willamina Creeks. The County experiences annual rain and wind events that assail river shorelines combined with landslides and debris flows within the watersheds, loss of plant cover in riparian areas, and river traffic induced erosion, particularly during severe storm events.

Table 5-9 lists erosion hazard areas identified by the Steering Committees in each jurisdiction (Figures K-14-K-14F)

Table 5-9. Erosion Hazard Areas within Yamhill County

Community	Description of Location
City of Carlton ¹	Hawn Creek and North Yamhill River

Table 5-9. Erosion Hazard Areas within Yamhill County

Community	Description of Location
City of Dayton ²	Yamhill River, Palmer Creek, and West-Fork Palmer Creek
City of Dundee ³	Willamette River
City of Newberg ⁶	Willamette River
City of Willamina ⁴	^a Willamina Creek, South Yamhill River
County ⁵	^a Ferry & Webfoot Subdivision, ^b Canary grass has been planted causing tree reduction

¹-City of Carlton Hazard Mitigation Planning Steering Committee, August, 2008.

²-City of Dayton Hazard Mitigation Planning Steering Committee, August, 2008.

³-City of Dundee Hazard Mitigation Planning Steering Committee, August, 2008.

^{4, a}-City of Willamina Hazard Mitigation Planning Steering Committee, August 2008

⁵-City of Dundee Hazard Mitigation Planning Steering Committee, August, 2008.

⁶-City of Newberg Hazard Mitigation Planning Steering Committee, August, 2008.

^{a, b}-Verbal comments from Rita Baller 8/18/08 to Laura Young.

5.3.8.4 Extent

A variety of natural and human-induced factors influence the erosion process. For example, embankment orientation and exposure to prevailing winds (which can be altered by human development) all influence erosion rates. Other factors that may influence riverine erosion include:

- Geomorphology (composition)
- Structure types along the river embankments
- Development density
- Amount of encroachment in the high hazard zone
- Proximity of erosion-inducing structures
- Nature of the shoreline topography
- Embankment elevation
- Embankment wind exposure

Rivers constantly alter their courses, changing shape and depth, trying to find a balance between the sediment transport capacity of the water and the sediment supply. This process, called riverine erosion, is usually seen as the wearing away of the water course's banks and beds over a long time period.

Riverine erosion rarely causes death or injury. However, erosion causes significant destruction of property, development, and infrastructure.

Landslides, debris flow scour, embankment failure, or heavy rainfall often initiated riverine erosion. These processes generate high volume and velocity run-off which will concentrate in the lower drainages within a river's catchment area. When the stress applied by these flows exceeds the resistance of the embankment material, erosion will occur. As the sediment load increases, fast-flowing waters will erode their banks downstream. Eventually, the river, creek, or tributary becomes overloaded or velocity is reduced, leading to the deposition of sediment

further downstream or in dams and reservoirs. The deposition may eventually lead to the watercourse developing a new channel.

While all rivers change in the long-term, short-term change rates vary significantly. All rivers can be categorized based on their ability to adjust their shape and gradient as either bedrock or alluvial channels.

The erosion rate depends on the sediment supply and amount of run-off reaching the watercourse. These variables are affected by many factors including earthquakes, floods, climatic changes, loss of bank vegetation, urbanization, and the civil works construction projects in the waterway.

Erosion along the banks of the rivers and streams in Yamhill County is generally caused by a combination of factors:

- The natural process of a watercourse to find the path of least resistance.
- Debris flows within the watershed.
- Loss of riparian area plant cover.
- Logging.
- Increased boat traffic close to the shoreline.
- Runoff from rainfall.

While erosion has been identified as occurring within the county, few events were reported to result in damage. Based on past events and the lack of development in proximity to erosion hazard areas, the magnitude and severity of erosion impacts in the County are considered negligible, with the potential for critical facilities to be shutdown for 24 hours or less, and less than 10% of property or critical infrastructure being severely damaged.

5.3.8.5 *Probability of Future Events*

Based on historic events it is possible that structures located near the shoreline of the County's major rivers, creeks, and their tributaries are vulnerable to erosion. Erosion data is limited to localized geographic areas within the County identified by the participating jurisdictions.

5.3.9 *El Niño/Southern Oscillation*

El Niño/Southern Oscillation (ENSO) comprise two weather phenomenon known as El Niño and La Niña. While ENSO activities are not a hazard itself, it can lead to severe weather events and large-scale damage throughout the jurisdictions in Yamhill County. Direct correlations have been found linking ENSO to severe weather across the Pacific Northwest, particularly drought, flooding, and severe winter storms. (State of Oregon 2004) Therefore, increased awareness and understanding of the impacts of El Niño and La Niña on regional weather are important in hazard mitigation planning.

For more detailed discussions on drought, flood, and winter storms, please refer to their respective sections in this chapter.

5.3.9.1 Nature

ENSO weather patterns portray periodic warming and cooling of the central Pacific Ocean. This warming and cooling cycle has global implications as normal weather patterns are altered over vast areas of the world, causing changes in temperature and precipitation from Chile to Indonesia to the Pacific Northwest.

During El Niño periods, alterations in atmospheric pressure in equatorial regions yield an increase in the surface temperature off the west coast of South America. This gradual warming sets off a chain reaction affecting major air and water currents throughout the Pacific Ocean. In the North Pacific, the Jet Stream is pushed north, carrying moisture laden air up and away from its normal landfall along the Pacific Northwest coast. In Oregon, this shift results in reduced precipitation and warmer temperatures, normally experienced several months after the initial onset of the El Niño. (Taylor 2008) These periods tend to last nine to twelve months, after which surface temperatures begin to trend back towards the long-term average.

La Niña periods ensue when surface temperatures increase past the long-term average. Typical weather patterns throughout the Pacific Ocean are strengthened, yielding stormier than normal weather throughout the Pacific Northwest. Above average precipitation and colder temperatures are experienced across Oregon during these periods, with the potential for severe snow storms increasing. (Taylor 2008) These periods generally last longer than El Niño events, taking anywhere from one to three years to dissipate.

Both El Niño and La Niña periods tend to develop between March and June, and peak from December to April. (NOAA 2005)

5.3.9.2 History

An examination of past ENSO patterns show El Niño and La Niña have been regularly observed in Oregon. Direct correlations have been found linking precipitation, temperature, and snowfall with ENSO across Oregon, including Yamhill County. (Taylor 2008) In general, El Niño periods result in warmer temperatures and lower precipitation, while La Niña periods are colder and wetter. (Lubomudrov 2008)

Strong El Niños of 1982 and 1997 were observed throughout the state, and the El Niño in 1994 resulted in widespread drought conditions. Alternatively, severe flooding caused by the heavy snow and intense rain in the winters of 1995-1996 and 1998-1999 were due to La Niñas. (State of Oregon 2004)

5.3.9.3 Location

ENSO affects weather patterns on a global scale. Any local climate changes experienced in Yamhill County will be reflective of a much broader trend impacting the entire Pacific Northwest. Hazards resulting from one of these periods will most likely be spread across large regions of the state, with adjoining counties experiencing similar conditions.

5.3.9.4 Extent

Yamhill County has a climate generally consisting of wet winters and dry summers. (ONHW 2006) During El Niño years, decreased precipitation and increased temperatures throughout the

winter can lead to drought. Alternatively, increased precipitation and decreased temperatures associated with La Niña periods can result in widespread flooding and severe winter storms.

5.3.9.5 *Probability of Future Events*

As climate scientists continue to unravel the oceanic and atmospheric relationships governing ENSO, predictive powers are growing. 1997 marked the first time an El Niño was accurately forecasted, and as more studies detail how ENSO impacts the Pacific Northwest, and Oregon in particular, hazard mitigation agencies will benefit from increased warning time. ENSO generally follows a two to seven year cycle, with El Niño or La Niña periods occurring every three to five years. However, the cycle is highly irregular, and no set pattern exists (Taylor 2008). Furthermore, variations are likely to continue, and not all droughts and floods are related to El Niño or La Niña events. (State of Oregon 2004)

5.3.10 Drought

5.3.10.1 *Nature*

Drought is variously defined as a period of abnormally dry weather creating hydrologic imbalance, shortage of precipitation adversely affecting crops, or a period of below average water in streams and lakes, reservoirs, aquifers, and soils. (USGS 2008) There is no universal measure of precipitation or dryness that signifies drought. Historically, droughts have been seen as unpredictable and unavoidable events. Climate fluctuations occur everywhere, and periods of low precipitation are a normal, recurrent feature of climate.

Drought is commonly referenced in terms of its effects on agriculture, with crop damage or failure used to measure its effects. Other direct environmental effects of drought include livestock death or decreased production, wildland fire, impaired productivity of forest land, damage to fish habitat, loss of wetlands, and air quality effects. Indirect effects to society are measured by the economic and physical hardships brought on by drought and by the increased stress on residents of a drought-stricken area. (ONHW 2004) The economic impact of drought is estimated between \$6 and \$8 billion annually in the United States. These costs primarily affect agricultural, forestry, fisheries, recreation and tourism, transportation and energy sectors. Drought is also associated with insect infestation, disease, and wind erosion. (ONHW 2006)

Drought is usually thought of as a meteorological phenomenon, resulting from abnormally low precipitation. It can also be an institutional phenomenon, resulting from poor management of water supply and reserves—an imbalance in supply and demand—and is often due to a combination of these factors. Understanding drought as a recurring climate cycle is a first step toward creating management practices that effectively mitigate its effects.

Drought is difficult to measure, due to its diverse geographical and temporal nature, and its operation on many scales. Despite that difficulty, various indices for measuring and characterizing drought can be useful. The Palmer Drought Indices and the Standardized Precipitation Index are most commonly used. Palmer's indices describe water balance—looking at water supply (precipitation), demand (evapotranspiration), and loss (runoff)—on three scales; weekly during growing season, long-term cumulative measured by month, and another long-term scale that takes into account hydrological factors such as reservoir and groundwater levels.

These are the Crop Moisture Index, the Palmer Drought Severity Index, and the Palmer Hydrological Drought Index, respectively. The Standardized Precipitation Index considers precipitation alone, comparing the probability of a region's receiving a given amount of precipitation (based on historical levels) in a given time period with precipitation actually recorded. (NOAA 2008)

There are four types of drought: meteorological, agricultural, hydrological and socioeconomic. Meteorological drought is based on the degree of dryness. Agricultural drought focuses the amount of soil moisture versus the needs of the crops. Hydrological drought is associated with shortfalls of surface and subsurface water supply. Socioeconomic drought refers to physical water shortages and its human effect, and occurs when the need for water exceeds the supply resulting in a shortfall. (ONHW 2006)

5.3.10.2 History

Drought occurs in all parts of Oregon, and has had profound effects in the past on the state's economy, particularly the agricultural and hydro-power sectors. Environmental consequences have included insect infestations in forests, insufficient stream flows to support endangered fish species, and increased susceptibility to fire.

The following past drought events were recorded for Yamhill County:

- 1928-1941-Statewide prolonged drought caused major agricultural problems
- 1976-1981-Stream flows were low for western Oregon; 1976 and 1977 were the driest years of the century.
- 1985- 1994-Ten consecutive years of drought cause problems statewide; fires were common and insects attacked trees; a drought emergency was declared in 1992.
- 2000-2001-Severe drought conditions; October 2000 to February 2001 was the second driest period of record in Washington and Oregon.
- 2003-Yamhill County was one of nine counties designated a disaster area brought on by an ongoing drought and became eligible for disaster relief.
- 2005-February 2005 was the driest since 1977. (ONHW 2006)

5.3.10.3 Location

Droughts occur in every climate zone, and can vary from region to region. Drought occurs in all parts of Oregon, and has had profound effects on the state's economy, particularly the agricultural and hydro-power sectors. All parts of the county are susceptible to drought.

5.3.10.4 Extent

Drought is often associated with El Niño events affecting the polar and subtropical jet streams. The polar jet stream dips southward causing the northwest to be drier than average. The severity of drought depends on the degree of moisture deficiency, duration, and size of the affected area. The agricultural sector is usually the first to feel the impacts of drought because of its

dependence on soil moisture. Those reliant on surface and groundwater sources are usually the last to feel the effects of drought. (ONHW 2006)

5.3.10.5 Probability of Future Events

As part of a statewide HMP process, county emergency management program managers conducted risk analyses to determine probability of, and vulnerability to, severe drought occurrence in each county. Oregon's Partnership for Disaster Resilience assesses Yamhill County as having an "average risk" for drought; a future drought affecting the planning area is likely. (*Partnership* 2008)

Drought appears to be a cyclic part of the climate of Oregon, occurring in both summer and winter, with an average recurrence interval between 8 and 12 years. Short-term, seasonal events are more frequent, while the less frequent, long-term events have ranged from 3 to 12 years in length.

Estimating drought probability and frequency is difficult, but understanding cyclic climate variations and other variables that contribute to weather behavior is advancing. (State Interagency Hazard Mitigation Team 2006) Understanding the ENSO weather systems are helping scientists to better predict weather changes in the Pacific Northwest.

5.3.11 Dam Failure

5.3.11.1 Nature

Dams are impervious artificial barriers typically constructed of earth, rock, concrete, or mine tailings. The purpose of a dam is to divert water or impound (store) water, wastewater, or liquid-borne materials for any one or a combination of several reasons including:

- flood control
- human water supply
- irrigation
- livestock water supply
- energy generation
- mine tailings containment
- recreation
- pollution control

Dams can be embankment dams constructed with excavated natural materials or masonry dams constructed with stone, brick, or concrete blocks painted with mortar. Most dams are built at the narrowest part of a river on a stable foundation made of concrete, rock, or compacted soil. The abutments of a dam can be the natural valley walls or constructed of artificial materials when a natural abutment is not suitable. There are several types of dams named for the primary material used in construction, the primary purpose of the dam, and/or the way the dam is engineered to function. Common types of dams include:

- **Diversion Dam:** diverts water from one waterway to another waterway
- **Arch Dam:** a concrete dam that is convex on the upstream side and concave on the downstream side, taking advantage of the water load itself to compress the concrete, and allowing the majority of water load to shift to the abutments
- **Overflow Dam:** designed to be overtopped
- **Regulating Dam:** designed to regulate water flow downstream
- **Gravity Dam:** constructed of masonry materials wherein the weight and internal strength provides stability

Dam inundation is the flooding that occurs resulting from the structural failure, breach, or improper operation. It is an “unscheduled release.” Inundation can also refer to the downstream extent or area which is flooded by the released water. Outlet works and spillways allow dam managers to make “scheduled releases” when necessary, e.g., to prevent damaging flooding and to prevent total dam failure. Dam failure can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding
- Seismic activity/Earthquake
- Landslides into reservoir or onto the dam itself
- Inadequate spillway capacity, resulting in excess overtopping flows
- Internal erosion caused by leaks in embankments, foundation, or piping
- Improper design or construction
- Improper maintenance or operation
- Upstream dam failure on the same waterway
- Vegetation growth
- Structural integrity loss from burrowing small animals

Dam failures can create flash floods that are catastrophic to life and property. Seismic activity can directly cause dam failure, and can also generate a wave capable of overtopping a dam, which may inundate the surrounding area but not cause dam failure. Two factors that influence the potential severity of a full or partial dam failure include: (1) the amount of water impounded, and (2) the density, type, and value of development and infrastructure located downstream.

The hazard potential for dams is determined by the downstream damage that could result from improper operation or dam failure. It is important to note that neither the integrity of a dam nor the probability of failure are considerations when determining the hazard potential. The hazard potential rating for dams describes only the extent of expected losses if the dam were to fail. Hazard potential categories are organized into three tiers:

High hazard: dam failure or improper operation would probably cause loss of life. Economic, environmental, and lifeline losses are also likely but not necessary for this rating, which is based solely on probable loss of life.

Significant hazard: dam failure or improper operation would cause property damage or temporary loss of roads or utilities, with a remote chance of loss of life.

Low hazard: dams would have little or no effect to life and property downstream in the event of failure or improper operation.

5.3.11.2 History

During the 1840s and 1850s, Yamhill County experienced substantial development. Shortly thereafter, dams were constructed to encourage the growth of cities and to help with local commodities such as farming and logging. Dams were used for irrigating fields and forming lakes for log storage. River transportation was also successful for moving commodities. With the success of river transportation, locks and dams were built to improve the waterways. (Yamhill County Parks, Lafayette Locks) (Carlton Citizen Involvement and Land Use Planning, 1999) There have been no known dam failures in Yamhill County.

5.3.11.3 Location

The National Inventory of Dams (NID), maintained by the US Army Corps of Engineers, is a database of all dams in the United States posing a significant or high hazard, or that meet inclusion criteria for dam height and storage (exceed 25 feet in height and 15 acre-feet of storage, or exceed 6 feet in height and 50 acre-feet of storage). There are many dams too small to be listed in the NID, but these small dams are not expected to have significant impacts if they fail.

NID lists 30 dams in Yamhill County. Of these dams, 23 are privately owned, six are owned by local government, and one is a public utility. However, only two dams are considered a concern by the participating jurisdictions, of which do not meet NID's criteria. These dams are summarized in Table 5-10.

Table 5-10. Jurisdiction Identified Dams

Dam Name	River	Owner	Year	Storage (acre-feet)	Hazard	EAP
Stoney Mountain Impound Facility (Under Construction- Completion Scheduled for Summer 2009)	East Creek	City of Sheridan	2007	184	L	N
Panther Creek Reservoir	Panther Creek	City of Carlton	1971	75	L	N

EAP refers to whether or not the dam has an emergency action plan, which is not required for dams in the size range of those listed here.

NID listed dams in Yamhill County are summarized in Table 5-11 and shown on Figure K-12.

Table 5-11. National Inventory of Dams - Yamhill County

Dam Name	River	Owner Name	Owner Type	Year Completed	NID Storage (acre-feet)	Hazard	EAP
Haskins Creek Dam	Haskins Creek; Trib/Yamhill R.	McMinnville Water and Light	L	1930	704	S	N
Pacific Plywood Log Pond	Willamina River	City of Willamina	L	1944	132	L	N
Hawn Creek Reservoir	Hawn Creek	Hawn Cr. District Improvement Corp.	L	1961	250	L	N
Panther Creek Reservoir	Panther Creek	City of Carlton	L	1971	100	L	N
McGuire Reservoir	Nestucca River	McMinnville Water & Light	U	1969	5000	H	N
Stoney Mountain Dam	Willamina Creek	Wm. J. Shaw	Earthen	1942	184	L	N
Turner Creek Reservoir	Turner Creek	Yamhill City	L	1978	60	L	N
Dundee Sewer Project	Municipal Waste	City of Dundee	L	1979	65	L	N

OWNER TYPE: F=Federal, S=State, L=Local Government, U=Public Utility, P=Private.

NID STORAGE: A calculated field based on maximum storage and normal storage.

EAP refers to whether or not the dam has an emergency action plan, which is not required for dams in the size range of those listed here.

5.3.11.4 *Extent*

The extent of dam failure effects in Yamhill County can be assessed region-wide or by each body of impounded water. Effects depend a great deal on the nature of the failure—for instance, whether a dam fails when retaining a normal level of water, or whether water influx is involved in the dam failure, which then involves a greater-than-usual volume of impounded water. Likewise, whether a dam is overtopped, damaged, or fails will make a great difference in volume of water released, and therefore in effects. An isolated dam failure, even a significant release, may have less significant impact than a series of dam failures caused by region-wide flooding.

The City of Sheridan's Stony Mountain Impoundment Facility is a spring-fed reservoir, retained by a reinforced earthen dam approximately 10 miles outside of town. The emergency spillway empties into La Toutena Mary Creek. The dam embankment, if breached, will spill into a La Toutena Mary Creek tributary, and the flood hydrograph will travel 3.37 miles to the La Toutena Mary Creek and East Creek confluence, with an additional 3.15 miles to East Creek's confluence with Willamina Creek. Based on a clear day piping failure stimulated by the

City of Sheridan, if the dam embankment was breached, it would take approximately 35 minutes for the dammed water to travel the 3.37 miles to the East Creek confluence and an additional 100 minutes to travel to the Willamina Creek confluence.

Under normal conditions, the flood wave would start with approximately 10,670 cubic feet per second (cfs) at the dam and end with approximately 1,090 cfs at Willamina Creek. Due to the limited size of the watershed, the limited inflow to the reservoir, and the height of the dam compared to the emergency spillway (1657 feet vs. 1653 feet), an overtopping failure is unlikely. Thus, a catastrophic failure of the dam would not present a threat to human life downstream. Neither the road nor any residential structures would likely be inundated by the flood wave generated by a piping failure.

Even when the clear-day scenario was tested using more extreme assumptions, such as increased water levels, a dam failure still did not pose a threat to residential structures. Possible developments that could cause piping failure include rapid drawdown, seismic activity, or slope failure. As water flows through the dam, the passage could continue to grow as material is eroded away. Eventually the size of the passage could compromise the structural integrity of the dam and cause it to collapse. (City of Sheridan Dam Failure Analysis, 2007)

The City of Carlton's Panther Creek Reservoir is approximately 8 miles west of town. The drainage basin above the dam is approximately 3.19 square miles. There has been some erosion caused by tree removal activities by local landowners during the rainy season. There is a main 4.5 mile long 10-inch diameter transmission line to the city, which includes a 6-inch emergency connection with the McMinnville Water and Light main transmission line. However, no agreement exists as to when the connection can be used. (City of Carlton Citizen Involvement and Land Use Planning, 1999)

The City of Willamina's Dam is an earthen dam located approximately 12 miles north of town. It is expected that a dam failure would affect the city by causing a mud flow down Willamina Creek. There is also a moderate concern of debris flowing down Willamina Creek in the case of a dam failure of the City of Sheridan's Stony Mountain Impoundment Facility. (City of Willamina Hazard Profile)

5.3.11.5 *Probability of Future Events*

There is always the possibility of dam failure. Dam failures can result from a variety of causes, including:

- Prolonged periods of rainfall and flooding
- Seismic activity/Earthquake
- Landslides into reservoir or onto dam itself
- Inadequate spillway capacity, resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping
- Improper design or construction
- Improper maintenance or operation
- Failure of upstream dams on the same waterway

- Vegetation growth
- Burrowing small animals

To try and prevent dam failure from controllable factors, such as improper design or maintenance, the Oregon Water Resources Department manages dam safety and requires dam owners to submit their plans prior to construction, as well as prepare for periodic inspection of existing dams. However, there is no required frequency of inspections by Oregon law. For example, Panther Creek was last inspected October 19, 1989. Owners are expected to maintain their hydraulic structure and make repairs as needed. (Oregon State Water Resources Department Dam Safety Guide).

Given that there are no recorded dam failure events in the county, it is impossible to predict the probability of future events of dam failure with significant effects on the jurisdictions along the waterways. The risk to the jurisdictions in Yamhill County from upstream dams, and the history of dam failures in those areas, has yet to be evaluated. Also, it is important to note that global and regional climate change could alter the likelihood of dam failure in the planning area, if increasing storms and rainfall were to significantly change water inflow.

5.3.12 Disruption of Utility and Transportation Systems

Disruption of utility and transportation systems is treated as a separate hazard because, while such disruption is a potential impact of each of the natural and human-caused hazards reviewed, its ramifications are far-reaching and much broader than direct damage and direct loss of service.

It is important to remember, in considering any of the other hazards profiled in this plan, that disruption of utility and transportation systems should be viewed in addition to other impacts. The probability, duration, extent, and risk associated with disruption of systems is described below, and in some cases quantified. Electric power outages are dealt with in more detail than other disruptions because loss of electric power has the most widespread effects on other utilities.

5.3.12.1 *Nature*

The major transportation modes of significance to Yamhill County are roads and railways. Both are subject to disruption from the hazards profiled in this plan; flood, dam failure, landslide, earthquake, volcano, wind, fire, winter storm, infectious disease epidemic (quarantine, public transit restrictions), hazardous materials incidents, and terrorism.

The ramifications of transportation system disruption range from effects on life, health, and safety (emergency vehicle mobility, access to hospitals, access to evacuation routes, access to vital supplies if transport is seriously disrupted for an extended period of time) to the economic effects of delays, lost commerce, and lost time.

Similarly, disruption of utility systems can affect the county at the level of commerce and recreation as well as at the level of fundamental health and safety. Analysis of potential utilities disruptions is complicated because utilities like electric power, potable water, wastewater, natural gas, and telecommunications are all networks, consisting of nodes (centers where something happens) and links (connections between nodes). Networks typically have some

level of redundancy built in, and the amount and nature of alternate pathways determines the robustness of the system to any particular disturbance. (Goettel 2005)

Many water treatment plants in Yamhill County are located in flood-prone areas. Flood water inundation can cause raw water to circumvent and contaminate source wells and filtration and treatment systems. Earthquakes can damage water storage, treatment, and transport systems. Water systems are also extremely vulnerable to power outages. Storage tanks are usually located 60 to 200 feet above the water customer network, and water is pumped into these tanks using electricity. Storage tanks typically contain one to two days supply of water. Power outages of longer duration can result in a shortage of clean water for drinking and cooking—a basic requirement for public health. (Goettel 2005)

Wastewater management is also crucial for public health, and wastewater systems are similarly vulnerable to floods, earthquake damages, and power outages. Floods may cause collection pipes to overflow, and can cause inflow that exceeds treatment plant capacity, resulting in release of untreated or partially treated wastewater. Treatment plants are often located in low-lying areas, which facilitates gravity flow of collected wastewater to the plant. However, this means that treatment plants are often found in flood zones. Wastewater pipes and plants are subject to earthquake damage, and loss of power can result in plant shutdown and releases of untreated or partially treated water. (Goettel 2005) Public health hazards can be posed by backed up wastewater and sewage, as well as by releases of untreated or incompletely treated waste water.

Natural gas systems (compression stations and distribution pipes) are vulnerable to seismic events, and compression stations are vulnerable to flood damage and power loss. Landslides, too, can affect natural gas systems. (Goettel 2005) Where it is used for cooking or heating, disruption of natural gas distribution will create difficulties. Leaks in enclosed areas present a health hazard, and it is both flammable and explosive, attributes which are addressed in the Hazardous Materials section.

Telecommunications systems (including telephone, broadcast radio and television, as well as cable networks) are generally somewhat less vulnerable to hazards than other services, given that few nodes (stations) are located in flood zones or landslide areas. Buried lines have more ability to stretch than do gas and water lines, and can usually accommodate several feet of ground movement before failing. Above-ground lines are vulnerable to falling trees or the failure of poles, but disruptions are about ten times less common than electrical line failures—partly because electrical lines are the highest on utility poles and therefore the first to be hit by falling trees and branches, and partly because the much lower voltage of communications lines makes them much less vulnerable to arcing or shorting out if lines come very close to one another. (Goettel 2005) Telecommunications failures can have devastating impacts on a community. Emergency response systems at the individual level (fire, police, ambulance) as well as at the disaster-response level rely on immediate, accurate communications.

Electrical power plants and transmission lines are vulnerable to most of the hazards covered in this Plan. Flood, fire, earthquake, volcano, intentional sabotage and/or terrorism are all threats to power sources and transmission and distribution lines. Portland General Electric supplies electrical power to Yamhill County. Electric power is pivotal to modern life. Residential, commercial, and public facilities all rely heavily on electricity. Emergency facilities such as hospitals and emergency response centers typically are equipped with backup generators for

critical life-support and communications functions. Nonetheless, the consequences of long-term and widespread electrical power outages are significant. Other utility systems, discussed above, are also dependent on electricity for normal operations, so electric power loss can have serious secondary effects. In addition, power outages longer than a few hours can greatly increase the impact of riverine floods, as drainage districts and drainage improvement companies rely on pumping to keep diked areas dry.

5.3.12.2 *History*

System disruptions are deemed a secondary hazard or a result of a primary hazard event and receive discussion in the natural hazards section through this document.

5.3.12.3 *Location*

Yamhill County has and relies upon modern infrastructure: transportation and utility systems are the basis of everyday life in both urban and rural areas of the county.

The County has worked with each community to identify critical system networks and links which may experience critical failure from these technological hazards. To that end, nine of the ten jurisdictions have expressed that they have or are working to acquire emergency generators, bury utility lines, and ensure fuel availability for their critical infrastructure's sustainability. Many of the communities have also identified the need to work with their utility suppliers to encourage them to consider mitigating power line failure projects, developing plans for fuel distribution, and water-waste treatment alternatives.

The most common countywide relied upon critical components are summarized below in Table 5-12. Information on actual utility system networks and locations is held by the utility companies themselves and by individual jurisdictions within the county.

5.3.12.4 *Extent*

The vulnerability extent of this hazard is countywide. Virtually every hazard profiled in this plan can result in transportation or utility service disruption.

5.3.12.5 *Probability of Future Events*

Because virtually every hazard profiled in this plan can result in disruption of transportation or utility service, future events are highly probable.

HAZARD PROFILES

Table 5-12. Countywide Infrastructure Affected by Utility and Transportation System Disruptions

	Central Governance And EOC	Electrical Power Distribution	Emergency Medical Response And Care	Emergency Response Access/ Transportation Route	Emergency Response And Equipment Maintenance	Coordinate Emergency Repairs	Emergency Transportation	Fire Equipment/ Management, Emergency Response	Fuel Distribution	Law Enforcement/ Emergency Response	Law Enforcement/ Confinement	Material Transportation	Possible Shelter/ Community Aid Centers	Public Health And Safety	Volunteer Organization/ Dispatch Center
Airport/ Heliport							S					S			
City Hall	A,CA, D,DU, L,S,Y														
Courthouse/ Jail			S	S			S				A, CA				
Police/Sheriff Station										A,CA, D,S,W ,Y					
Fire/Rescue Dept			L	L		L		A,CA, D,DU, L,S,W ,Y							
Medical			CA, D,S												
Elec. Pwr. Distr./Comm.		A,CA,D ,DU,S, W,													
Potable Water Distr.														A,CA, D,DU, L,S,W, Y	
Waste Water Treatment														A,CA, D,DU,	

HAZARD PROFILES

Table 5-12. Countywide Infrastructure Affected by Utility and Transportation System Disruptions

	Central Governance And EOC	Electrical Power Distribution	Emergency Medical Response And Care	Emergency Response Access/Transportation Route	Emergency Response And Equipment Maintenance	Coordinate Emergency Repairs	Emergency Transportation	Fire Equipment/Management, Emergency Response	Fuel Distribution	Law Enforcement/Emergency Response	Law Enforcement/Confinement	Material Transportation	Possible Shelter/Community Aid Centers	Public Health And Safety	Volunteer Organization/Dispatch Center
														L,S,W,Y	
Public Works				A,D,D U,S											
Maintenance					A,D, DU, S										
Railroad				A,DU, L,S,W			A, W					A, W			
Bridges				A,CA, D,L,S, Y											
Highway				A,CA, D,DU, L,S,W, Y											
Marina/Port															
Private Fuel Distr.									A,CA,D, DU,L,S, W,Y					A,CA, D,DU, L,W,Y	
Private Nat. Gas Distr.									A,CA,D, DU,L,S, W,Y					A,CA, D,DU, L,S,W, Y	
Private									S					A,	

HAZARD PROFILES

Table 5-12. Countywide Infrastructure Affected by Utility and Transportation System Disruptions

	Central Governance And EOC	Electrical Power Distribution	Emergency Medical Response And Care	Emergency Response Access/ Transportation Route	Emergency Response And Equipment Maintenance	Coordinate Emergency Repairs	Emergency Transportation	Fire Equipment/ Management, Emergency Response	Fuel Distribution	Law Enforcement/ Emergency Response	Law Enforcement/ Confinement	Material Transportation	Possible Shelter/ Community Aid Centers	Public Health And Safety	Volunteer Organization/ Dispatch Center
Trans. Co.															
Churches													A,CA,D, DU,L,S, W,Y		A,CA,D, DU,L,W, Y
Schools & District Offices													A,CA,D, DU,L,S, W,Y		A,CA,D, DU,L,S, W,Y
Community/ Civic Center													D,L,Y		D,L,Y
Dam														CA,Y	
Key: A: Amity, CA: Carlton, C: County, D: Dayton, DU: Dundee, L: Lafayette, N: Newberg, S: Sheridan, W: Willamina, Y: Yamhill															

5.3.13 Hazardous Materials

5.3.13.1 Nature

Hazardous materials can be simply defined as any materials having a negative impact on health; human, animal, aquatic, or environmental. Hazardous materials exposure may cause injury, illness, or death. Exposure impacts may be evident within seconds, minutes, or hours. Or impacts may not surface until days, weeks, or even years after exposure. Also, it is important to note that harmful effects can be short- or long-term.

Some hazardous materials are highly toxic so that even brief exposures to minute amounts may be dangerous or even fatal. Other hazardous materials are much less toxic. Negative effects may occur only after a significant exposure to large quantities of a substance, or exposure to smaller quantities for a prolonged period of time. The technical term “toxic,” or “toxicity,” which is widely used to describe hazardous materials, is simply a synonym for the more common terms “poison” or “poisonous.” A toxin is thus defined as any substance that causes injury, illness, or death to living tissue by chemical activity.

The Institute of Hazardous Materials defines hazardous materials according to several regulatory agencies:

*...any item or agent (biological, chemical, physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. **Hazardous materials professionals** are responsible for and properly qualified to manage such materials. This includes managing and/or advising other managers on such items at any point in their life-cycle, from process planning and development of new products; through manufacture, distribution, and use; to disposal, cleanup, and remediation.*

Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the U.S. Environmental Protection Agency (EPA), the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Department of Transportation (DOT), and the U.S. Nuclear Regulatory Commission (NRC). Each has its own definition of a "hazardous material."

OSHA's definition includes any substance or chemical which is a "health hazard" or "physical hazard," including: chemicals which are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents which act on the hematopoietic system; agents which damage the lungs, skin, eyes, or mucous membranes; chemicals which are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive or water-reactive; and chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the previously mentioned characteristics. (Full definitions can be found at 29 Code of Federal Regulations (CFR) 1910.1200.)

EPA incorporates the OSHA definition, and adds any item or chemical which can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment. (40 CFR 355 contains a list of over 350 hazardous and extremely hazardous substances.)

DOT defines a hazardous material as any item or chemical which, when being transported or moved, is a risk to public safety or the environment, and is regulated as such under the: Hazardous Materials Regulations (49 CFR 100-180); International Maritime Dangerous Goods Code; Dangerous Goods Regulations of the International Air Transport Association; Technical Instructions of the International Civil Aviation Organization; U.S. Air Force Joint Manual, Preparing Hazardous Materials for Military Air Shipments.

The NRC regulates items or chemicals which are "special nuclear source" or by-product materials or radioactive substances. (See 10 CFR 20).

<http://www.ihmm.org/dspWhatIsHazMat.cfm>

Both Federal and State of Oregon statutes govern hazardous materials. Federal regulations include the Clean Air Act, Emergency Planning and Community Right to Know Act, and Superfund Amendments and Reauthorization Act. Oregon statutes are listed below:

- ORS Chapter 453, 453.001 to 453.185 and 453.605 to 453.807
- ORS Chapter 465, Hazardous Waste, Haz. Mat. I
- ORS Chapter 466, Hazardous Waste, Haz. Mat. II
- ORS Chapter 475, 475.405 to 475.495, Illegal Drug Clean-up
- ORS Chapter 480, Explosives, flammable materials, pressure vessels.

Hazards are found nearly everywhere; petroleum products, natural and synthetic gas, acids, and other acutely toxic chemicals found in everyday products such as paints, solvents, adhesives, household cleaners, pesticides and herbicides, batteries, and even medicines.

This plan does not focus on the hazards in everyday products, but rather on the larger quantities of hazardous materials classified as Hazardous Substances (HS) or Extremely Hazardous Substances (EHS) that are transported through the planning area by rail, highway, and air. Hazardous substances can present problems when spilled, however EHS potentially pose the most catastrophic threat as the category includes substances, such as chlorine and ammonia, which pose an acute inhalable toxic threat to humans and animals. (Alaska State HMP, 2007)

The toxicity of a specific substance is one important factor in determining the risk it poses, but there are other factors that can be just as if not more significant. Factors affecting the severity of an accidental release include toxicity, quantity, dispersal characteristics, release location, population density, environmental sensitivity; and, efficacy of response and recovery actions.

Hazardous materials are generally classified by their primary health effects on humans. Some common types include the following:

- Anesthetics and narcotics: depress the central nervous system.
- Asphyxiants: interfere with normal breathing and can cause suffocation.
- Explosives: pose explosion, fire, and chemical danger.
- Flammable materials: catch fire easily, although they may pose other dangers such as explosion or chemical effects. Gasoline, propane, and diesel fuel are common examples in this category.
- Irritants: cause burns or irritation to body tissues such as eyes, nose, throat, lungs, or skin.

Hazardous substance exposure generally takes place by one, or a combination of the following mechanisms:

- Direct contact with skin or eyes
- Ingestion via contaminated food or water

- Particulate or gas inhalation via contaminated air

Unless exempted, facilities that use, manufacture, or store hazardous materials in the US fall under the regulatory requirements of the Emergency Planning and Community Right to Know Act, and must report to the United States Environmental Protection Agency (EPA). Releases of HS and EHS can occur at facilities or during transport. Transportation-related releases are generally more troublesome because they may occur anywhere, including close to human populations, critical facilities, or environmentally sensitive areas. Transportation-related EHS releases can also be more difficult to mitigate due to the great area over which any given incident might occur, and the potential distance from response resources.

Natural phenomena may also cause a hazardous materials release and complicate response activities from not only the primary but also subsequent or combined secondary events. For instance, earthquakes pose a particular risk, because they can damage or destroy facilities, fires can develop, explosions can occur, and high winds can disperse the released chemical. The threat of any hazardous material event may be further amplified by restricted access, reduced fire suppression, and spill containment capability. Response personnel and equipment may have their access cutoff as roads, highways, or railroad traffic are impeded. EHS releases can trigger evacuation and short- or long-term displacement creating social and business disruptions.

5.3.13.2 History

On behalf of several federal agencies including the EPA and Department of Transportation, the National Response Center serves as the point of contact for reporting oil, chemical, radiological, biological, and etiological discharges within the US. The National Response Center's Internet-based query system of non-Privacy-Act data shows that since 1997, 34 oil and chemical spills have occurred in Yamhill County. Of these spills, one was pipeline, eleven were transport, two were water, and three were toxic substance related incidents (Table 5-13). The majority of the County's incidents occurred in the Cities of McMinnville, Newberg, Sheridan, and Willamina.

The EPA recorded two unverified airborne hazardous material release report in addition to the oil and chemical spills.

**Table 5-13. National Response Center "Incidents" 1997-2007,
Yamhill County Oregon**

Entity	Toxic Releases Reported	Air Releases Reported	Transport Accident	Rail	Pipeline	Other
Yamhill County	3	2	11	--	1	19
City of Amity	-	-	2	-	-	2
City of Carlton	-	-	-	-	-	-
City of Dayton	1	-	-	-	-	-
City of Dundee	-	1	5	-	-	1
City of Lafayette	-	-	-	-	-	
City of McMinnville	2	-	4	-	1	3
City of Newberg	1	-	3	-	-	2
City of Sheridan	-	-	-	-	-	6
City of Willamina	-	-	1	-	-	4

**Table 5-13. National Response Center “Incidents” 1997-2007,
Yamhill County Oregon**

Entity	Toxic Releases Reported	Air Releases Reported	Transport Accident	Rail	Pipeline	Other
Yamhill City	1	1	1	-	-	1
Other	-	-	-	-	-	-

*From the State Fire Marshal’s Hazardous Substance Information Data Base at
<http://www.sfm.state.or.us/CR2K/cr2k.htm>*

Based on the demographics, geography, and supported by the State Fire Marshal’s Community Right to Know (CR2K) data for Yamhill County, most incidents occur within unincorporated county locations and the City of McMinnville.

5.3.13.3 Location

Hazardous Substances can be found throughout Yamhill County. The Oregon State Fire Marshal’s Office (OSFM) has documented 515 EHS sites with 2,975 identified substances in Yamhill County as shown in Table 5-14. Figures K-13 through K-13J show major transportation routes and 0.25 mile-buffered EHS sites that may be subject to hazardous materials impacts. The County’s ten major cities account for only 42 percent of the entire county’s EHS substances. Gas stations, garages, automotive repair facilities, millwork, manufacturing, food processing plants, agricultural supply, petroleum, natural gas, university and school laboratories, public swimming pools, are the major EHS users. The vast majority of these sites would be places where an unintentional release would create a localized event. Manufacturing and woodworking sites where EHS are used regularly could also create site-specific contamination from repeated spills or improper storage. The greatest exceptions to this would be an accident involving large EHS quantities used at large industrial complexes or being transported by either road or rail.

Table 5-14. Extremely Hazardous Substance Listed Sites in Yamhill County

Entity	# Facilities Surveyed	# Facilities Reporting Substances	% Facilities Reporting Substances	Total Substances Reported
Yamhill County	1,221	515	42	2,975
City of Amity	71	23	32	81
City of Carlton	61	32	52	171
City of Dayton	75	33	44	157
City of Dundee	50	23	46	78
City of Lafayette	24	11	46	28
City of McMinnville	408	175	43	1227
City of Newberg	344	125	36	689
City of Sheridan	84	39	46	295
City of Willamina	54	27	50	182
Yamhill City	56	27	61	66

As listed from the Oregon Hazardous Substance Information Survey Annual Report 2005

The Environmental Protection Agency's online "*Envirofacts TRI*" website and the Oregon State Fire Marshal's Office's website delineated Yamhill County's EPA regulated facilities. The following delineates the fixed facilities and transportation incidents.

Envirofacts TRI also provided EPA permitting information. Table 5-15 shows the indicated number of wastewater and stormwater, hazardous waste handler, and superfund permits; and also reported toxic substance and air releases. The indicated communities also have EPA identified sites with "Supplemental Environmental Interests" concerning recurring leaking storage tanks.

*Note: The supplemental environmental permits and regulatory programs. . . apply to the facility site or the environmental interest at the facility site. . . include state programs, compliance and enforcement programs, and National Pollutant Discharge Elimination Systems (NPDES) general permits.
(EPA, Facility Registry System)*

Table 5-15. EPA Notable Locations

	Water Discharge	Hazardous Waste Handler	Superfund	Toxic Substances	Air Release	Recurring Tank Leaks
City of Amity	5	6	-	-	-	-
City of Carlton	2	4	-	-	-	-
City of Dayton	5	4	-	-	2	-
City of Dundee	1	-	-	-	-	-
City of Lafayette	1	1	-	-	-	-
City of McMinnville	7	58	1	11	5	3
City of Newberg	6	61	-	2	1	1
City of Sheridan	2	6	1	2	3	-
City of Willamina	4	8	1	1	1	-
Yamhill City	4	3	-	-	-	-
Total	37	151	3	16	12	4

http://oaspub.epa.gov/enviro/fii_master.fii_retrieve?fac_search=primary_name&fac_value=&fac_search_type=Beginning+With&postal_code=&location_address=&add_search_type=Beginning+With&city_name=&county_name=yamhill&state_code=OR&epa_region_code=&sic_code=&all_programs=YES&sic_code_desc=&chem_name=&chem_search=Beginning+With&cas_num=&page_no=1&output_sql_switch=FALSE&report=1&database_type=ENVIROFACTS

Other small, fixed facilities (drycleaners, auto body shops, etc.) have varying and relatively small hazardous chemical usage and do not pose a significant risk to Yamhill County.

Large and small facilities can experience hazardous materials events from product delivery systems via road or rail transportation events. Transportation events occur along Yamhill County's highways; namely Highways 99W (Amity, Dundee, & Lafayette), Hwy 240 & 47 (Carlton), Hwy 155, 221 (Dayton), Hwy 18 (Sheridan and Willamina) and along the railroad corridor. The trucks and trains that use these transportation arteries commonly carry a variety of hazardous materials including fuel, crude oil derivatives, and chemicals. Chlorine, ammonia, acids and other chemicals can be very devastating to human and animal life and the environment.

The Oregon Department of Transportation (ODOT) monitored the movement of hazardous materials on Oregon roads in 1987. The study was conducted in three phases over three different three-day periods. Phase I was conducted in March, Phase II in August, and Phase III surveyed ports of entry at or near the borders of Washington, California, and Idaho in November.

During Phases I and II. Checkpoints were set up at 11 weigh-scale locations on various interstate highways (I) 5 and 84, U.S. Highways 30, 26, and 97, and State Road (SR) 99W, 99E, and 6. One checkpoint was set up in Dayton on west S.R. 99E.

A total of 2,511 hazardous materials placarded vehicles, representing 3,637 shipments, and 208 different hazardous commodities were surveyed. The study determined 5.5 percent (%) of total truck traffic at the survey sites carried hazardous materials. Vehicles marked with FLAMMABLE or COMBUSTIBLE placards ranked first with 54%, followed by CORROSIVE placards marking 16% of the 2,511 vehicles. Most DANGEROUS placarded vehicles carried both flammable and corrosive liquids together.

A total of 2,189 deliveries were bound for Oregon destinations, serving 186 cities in 36 counties. At the ports of entry, 35% of all vehicles were bound for out of state destinations. Most hazardous materials moved over the roads between 6 a.m. and 6 p.m. (70%) and 38% of those occurred between 8 a.m. and noon. DANGEROUS –placarded vehicles moved mostly at night between 6 p.m. and 6 a.m. Hazardous materials carrying vehicles moved at a rate of 46.5 per day or nearly two vehicles per hour.

Average hazardous material movement in Dayton was recorded at 25 vehicles per day or 1 vehicle per hour. The checkpoint at Dayton recorded 4.9% of hazardous material truck traffic. One hundred seventy-seven shipments were bound for Yamhill County carrying gasoline, fuel oil (diesel), oxygen refrigerated liquid, oxygen, liquefied petroleum gas, and acetylene. One hundred twenty-five stops were made in the county with 52 vehicles passing though to other destinations.

5.3.13.4 *Extent*

The extent of hazardous materials risk from any given incident depends heavily on materials dispersed, weather conditions, and water presence. Some materials, such as acids, tend to have localized fumes and destruction, while others can displace oxygen and cause suffocation. Many hazardous liquids and gases depend on wind for dispersal. Water can compound the hazard by dispersing materials or through reactions that convert chemicals into a gaseous state.

The toxicity of particular hazardous materials is an important measure of the potential impact of hazardous materials on affected communities, but not the only important measure. Other characteristics of hazardous materials, especially the quantity of material and the ease of dispersal of the material may be as important, or more important, in governing the level of potential threat to a community.

5.3.13.5 *Probability of Future Events*

Previous occurrences indicate the likelihood of a small oil or chemical spill occurring within Yamhill County about twice per year. However, more comprehensive information on the probability and magnitude of hazardous material events from all types of sources is not available. Wide variations among the characteristics of hazardous material sources and among the materials

themselves make such an evaluation difficult. While it is beyond the scope of this MHMP to make detailed hazardous materials probability and magnitude evaluations for Yamhill County, it is possible to determine building and critical facility exposure to this hazard. Five hundred-fifteen sites were identified as being EHS sites from annual EPA Tier II Material Inventory Reports.

Figures K-13 through K-13J show areas at risk from a hazardous material event, including an area within a 0.25 mile radius of major highways and railroad routes and EHS sites.

5.3.14 Terrorism

5.3.14.1 Nature

The Homeland Security Act of 2002, Public Law 107-296, 107th Congress, Nov 25, 2002, 6 USC 101, §2(15) defines terrorism as:

“...any activity that involves an act that is dangerous to human life or potential destructive of critical infrastructure or key resources; and is a violation of the criminal laws of the United States or of any State or other subdivisions of the United States; and appears to be intended to intimidate or coerce a civilian population; to influence the policy of government by intimidation or coercion; or to affect the conduct of a government by mass destruction, assassination or kidnapping.”

Terrorists may use a range of possible malevolent actions, including vandalism, arson, explosions and armed attacks, as well as use of chemical, biological, radioactive or nuclear materials.

- Chemical attacks: deliberate release of a toxic agent (gaseous, liquid, or solid) that can poison people or the environment
- Biological attacks: releases of large quantities of living, disease-causing microorganisms that have extraordinary lethal potential
- Radiological attacks: deliberate dispersal of radioactive materials, via dirty bombs (conventional explosives laced with radioactive materials) or other methods.
- Nuclear attacks: explosion of nuclear devices and the radioactive fallout from such explosions.
- Cyber-terrorism: deliberate disruption/damage of computer systems and data.

5.3.14.2 History

Two major underground movements active in Yamhill County, Oregon - the Earth Liberation Front (ELF) and the Animal Liberation Front (ALF) - are among the most destructive domestic terrorist groups in the United States. ALF, ELF, and related movements have claimed responsibility for more than 1,200 criminal acts since 1990 and caused more than \$110 million in property damage in the United States since 1976. (J. Lewis 2005, J. Lewis 2004) Since 1996, ALF and ELF have claimed responsibility for acts which have destroyed property in excess of \$13 million in Oregon alone.

In January 2006, 11 suspected members of an animal rights and environmental extremist cell in Oregon were indicted on 65 counts of conspiracy and related offenses including arson and attempted arson. The cell was allegedly responsible for a domestic terrorism campaign that spanned five Western states from 1996 to 2001. Specifically in Oregon, ELF is responsible for firebombing a Southern Oregon lumber mill office, toppling a high tension electric line, and torching a Clatskanie tree farm (Mail Tribune 2005). ELF burned part of the headquarters of a cottonwood plantation with damages estimated at \$1 million dollars.

5.3.14.3 *Location*

Oregon is home to a wide variety of criminal extremist groups including hate groups, anti-government groups, anarchists, and special issue movements like environmental and animal rights extremists, as well as activity by foreign terrorists. Individuals connected to these groups have used criminal activities to achieve their objectives, including arson, harassment, threats, extortion, home invasions, animal releases, sabotage, and destruction of private and government property. All jurisdictions throughout Yamhill County are subject to impacts associated with domestic terrorism.

5.3.14.4 *Extent*

Because of its location among logging industries and endangered species, Yamhill County is susceptible to the following types of terrorism: vandalism, cyber/computer hacking, and ecoterrorism actions.

5.3.14.5 *Probability of Future Events*

Based on past historic events in Oregon, Yamhill County may be at risk of terrorism incidents based on infrastructure and environmental resources.

5.3.15 Infectious Disease Epidemic

5.3.15.1 *Nature*

Infectious diseases impair or damage bodily functions. They are caused by foreign organisms entering the human body and multiplying; including bacteria, viruses, fungi, and protozoa. Infections range from mild to deadly. Organisms enter the body via means such as: skin contact; inhalation; ingestion; blood (intravenous contact, bites, or punctures); sexual contact; and transmission from mothers to unborn children.

While infectious diseases pose a threat to people of any age and health condition, they are often a greater hazard to very young children, older adults, or people with compromised health. Vaccines and other advances in medical technology have reduced risks of some infectious diseases; however, new diseases emerge, new strains of existing diseases appear, and diseases that have been previously eliminated may reemerge.

When a disease spreads rapidly, affecting a greater portion of the population than would normally be expected, we call it an epidemic. An epidemic that reaches worldwide proportions is called a pandemic. When an infectious disease reaches epidemic level, it is considered to be a

public health emergency. Such emergencies are commonly addressed through quarantine and immunization.

Viruses and bacteria are of particular concern in epidemics. Both types of organisms are capable of rapid mutation, and some mutations can make an organism more easily communicable, or more virulent, or resistant to the preventions or remedies that humans use against the disease. For instance, a new strain of a disease previously passed only from animal to human may be communicable between humans, and such a mutation will multiply rapidly because it affords the disease a way to colonize new hosts much more quickly. Because of the rapidly changing nature of infectious disease, even though recent historical data for Yamhill County would lead one to believe that infectious disease is not a problem today, public health officials carefully monitor communicable diseases as well as those with current limitations that preclude epidemic outbreaks. (L. Rivers, personal communication)

Non-communicable, vector-borne diseases (such as those carried by mosquitoes or ticks) are important in community education, but generally would not lead to an epidemic in their current forms. It is worth noting that there is an association between climate and many infectious diseases, and global climate change will affect the range and prevalence of certain epidemics. In 2005, the World Health Organization published a report on using climate, and climate change models, to predict infectious disease epidemics. A climate-base early warning system may become an important tool for public health officials. (Khun *et al.* 2005)

In Oregon, some of the most common pathogens that cause disease outbreaks are *E. coli*, *Salmonella*, *Shigella*, and norovirus. Outbreaks of pertussis, and measles still occur. Oregon is now tracking mumps as a reportable disease.

(<http://www.oregon.gov/DHS/ph/acd/outbreak/outbreak.shtml>)

Three diseases that occur or have potential to be introduced to the residents of Yamhill County are: norovirus, influenza, and West Nile virus. These diseases have been documented within the State of Oregon; information is available through the Oregon Department of Human Services, Public Health Emergency Preparedness. The state also tracks other infectious diseases that could become a hazard to the community in the future, such as the emerging avian influenza (bird flu).

Influenza

Influenza viruses have been present in the human population for many years. Major changes in the virus (antigenic shifts) in the 20th century have led to three pandemics or global outbreaks of the disease, identified by the country or region that first reported the outbreak: the 1918 Spanish Influenza; 1957 Asian Influenza; and the 1968 Hong Kong Influenza. The 1918 pandemic, which was the only major influenza outbreak during which the most affected population group was young, healthy individuals (18 to 34 years old), coincided with World War I, and the movement of many young men around the globe as soldiers. (L. Rivers, personal communication; Diamond, 1997)

Influenza viruses are passed between people through respiratory droplets that are spread by coughing or sneezing. Transmission is typically via air, but may also occur by contact with infected surfaces and then touching mucous membranes, such as those in the eyes, mouth, or nose. Incubation of the virus typically ranges from 1 to 5 days and symptoms generally last for 2 to 7 days. Symptoms may include fever, muscle aches, headache, cough, sore throat, runny or stuffy nose, and fatigue.

There are three types of influenza virus (A, B, and C) and many different strains of each type. Types A and B are known to cause annual epidemics, while Type C produces mild respiratory illnesses and is not known to cause epidemics. Influenza is a virus that mutates continually and rapidly in ways that essentially disguise the virus from human immune systems, so that previous exposure to, or illness from, the virus does not confer immunity. Vaccines are updated annually for Types A and B, based on the previous year's virus. (CDC 2008a)

In the northern hemisphere, influenza generally occurs from November through May. Peak months vary, but February is often the peak of flu season. The U.S. Center for Disease Control (CDC) reports that an average of 36,000 people died annually due to influenza between 1990 and 1999. In the same time period, an average of 226,000 people were hospitalized annually. (CDC 2008b)

Norovirus

The original strain of noroviruses appeared in Norwalk, Ohio in 1968. The virus produces a condition known as gastroenteritis, an inflammation of the stomach and intestines resulting in vomiting or diarrhea. The condition is often referred to as the "stomach flu," although it is not related to influenza. There are five groups of noroviruses and over 30 genetic clusters.

Noroviruses are transmitted between humans by eating or drinking food or water contaminated with feces from an infected person. Some reports indicate that the virus can be transmitted through droplets produced when a person is vomiting; the droplets may be swallowed by others. The virus is known to be highly contagious; transmission of the disease is often swift in high density situations such as nursing homes, cruise ships, schools, restaurants, and catered events. Incubation of the virus typically ranges from 12 to 48 hours and symptoms generally last from 24 to 60 hours.

The CDC believe that at least 50% of all foodborne outbreaks of gastroenteritis are caused by noroviruses. From July 1997 to June 2000, 232 outbreaks of norovirus illness were reported to the CDC. Of these, 57% were foodborne, 16% were spread person-to-person, and 3% were waterborne; the cause of transmission was undetermined in 23% of outbreaks. Common settings included: restaurants and catered meals; nursing homes; schools; and vacation spots or cruise ships.

Foodborne outbreaks are most common, the most frequent cause of which is thought to be direct contamination by a food handler immediately before consumption. Cold foods, such as salads, bakery products, and sandwiches, are often implicated, as are fluid foods such as salad dressing or cake icing. Food can be contaminated at its source, as in the case of oysters from contaminated waters. Some foods have been contaminated before distribution, leading to widespread outbreaks; examples include raspberries and salads. Waterborne outbreaks are often associated with sewage contamination of drinking wells or recreational water. (CDC 2008c)

West Nile Virus

West Nile virus is a mosquito-borne illness present in Oregon. It affects humans, horses, and birds. The disease does not, at present, spread from person to person, nor from animals to humans; it can only be contracted from the bite of an infected mosquito. Most infections are mild, with no symptoms or mild fever and flu-like symptoms, but in rare cases, a severe infection can cause encephalitis or death.

There exists the possibility that the virus could mutate in a manner that would make it more severe to humans, communicable between individuals, or both. For this reason, as well as for the small number of very serious cases, the disease is being carefully tracked. There are no vaccines nor cures at this point; avoiding mosquito bites is the best prevention. More information about the virus, and guidelines for prevention can be found at www.oregon.gov/DHS/ph/acd/diseases/wnile.

5.3.15.2 History

The Oregon Department of Human Services, Health Services, tracks disease outbreaks annually. There have been no epidemics in recent history. To give an idea of the current level of hazard within Yamhill County, the total number of communicable disease cases in the county during 2005 (the year for which this statistic was readily available) was 150. A statewide summary of reportable disease outbreaks with more than one outbreak in any given year, for the years 2002-2006, is provided in Table 5-16.

Table 5-16. 2002-2006 Oregon Disease Outbreaks

Causal agent	Number of cases in 2002	2003	2004	2005	2006
Norovirus	43*	78	97	68	130
Pertussis	8	6	-	5	2
Salmonella	7	13	22	12	11
Varicella	6	-	2	3	5
Campylobacter	2	1	3	-	1
Clostridium perfringens	2	3	2	-	-
Hepatitis A	2	1	-	-	3
Influenza	2	3	-	5	2
Scombroid	2	1	-	-	-
E. coli	1	4	1	7	5
Shigella	-	4	1	2	4
Echovirus	-	2	-	-	-
Streptococcus	-	2	1	-	-
Rotavirus	-	2	-	-	-
Listeria	-	-	-	-	2

* includes 5 suspected - no cases reported

Source: Oregon Department of Human Services, Health Services

5.3.15.3 Location

The entire population of Yamhill County is potentially susceptible to infectious diseases. Infectious diseases may occur throughout a school, spread to the community, and then county-wide. Transmission of disease is often greatest in high density situations such as nursing homes, schools, dormitories, and restaurants.

5.3.15.4 Extent

This section takes the example of an influenza epidemic or pandemic to illustrate the extent of a highly contagious disease. Planning for an influenza pandemic, whether “avian flu” or another

especially virulent influenza variant, would be the same for any community in the nation. Everyone would be susceptible; it cannot be known in advance which, if any, particular population segment would be most affected. Although pharmaceutical companies have prepared a vaccine directed at the present version of the avian flu, it would have to mutate further to become a communicable pandemic, and it is unknown to what extent, if any, the vaccine would apply to a new strain. Even if applicable, the avian vaccine cannot be grown in eggs (the standard method of mass-producing vaccines) and supply would be unlikely to meet demand. (L. Rivers, personal communication)

Immunity or resistance might then largely depend on inherent genetic diversity within the population, which is the case in any human population facing a newly emerged virulent disease. (Diamond, 1997)

5.3.15.5 *Probability of Future Events*

Based on historical events, Yamhill County can expect that there will continue to be limited outbreaks of infectious diseases each year, including food-borne viral and bacterial pathogens, measles, pertussis, hepatitis, and influenza, among others. The likelihood of any of these diseases reaching epidemic proportions in any given year is very low.

If another influenza pandemic occurs, Yamhill County is very likely to be affected. In the past century, there have been three influenza pandemics, with 40 and 10-year return intervals. The last one was in 1968, 40 years ago, which is one reason that health officials are becoming concerned about when the next one will occur. However, the emergence of pandemic illnesses depends on a number of extremely complex factors, which makes the timing of such an outbreak extremely difficult to predict.

As mentioned above, climate has an affect on communicable disease, and climate change could alter the repertoire of diseases that exist in Oregon, as well as outbreak frequency.

5.3.16 Expansive Soils

5.3.16.1 *Nature*

The addition of moisture to any soil will cause a change in volume, which is referred to as a shrink-swell characteristic. (USDA NRCS 2008) Expansive soils are typically comprised of clay minerals that, under some conditions, are capable of increasing in volume when moisture is added. Clay soils consist of mineral particles that are less than 0.002 millimeters in diameter.

Linear extensibility is used to determine the shrink-swell potential of soils. Linear extensibility refers to the change in soil volume as the moisture content is decreased from a moist to a dry state. The amount and type of clay minerals in the soil influence volume change. The volume change is described as a percentage value change for the soil being tested. A low shrink-swell potential is considered less than a 3% change in soil volume (Table 5-17); whereas a high shrink-swell potential is greater than 6% change in soil volume. (USDA NRCS 2008)

Table 5-17. Expansive Soil Criteria Based on Shrink-Swell Potential

Shrink-Swell Potential	Linear Extensibility (%)
Low	< 3
Moderate	3 - 6
High	6 - 9
Very High	> 9

Source: NRCS National Cooperative Soil Survey

Soil expansion may be caused by changes in soil moisture, variations in thickness and composition of the expansive foundation soil, non-uniform structural loads, and the geometry of the structure. (US Army 1983) Potential sources of moisture changes are variation in precipitation, poor gutter or water drainage, vegetation changes over time (such as root growth of nearby trees), and plumbing leaks. By affecting the relative moisture of soils underlying foundations, uneven movement such as localized heave can occur, causing shifting and non-uniform foundation movements, thus impacting the structures above.

However, many sources of soil moisture change can be avoided, minimized, or mitigated through planning and structure maintenance. Some signs of possible soil expansion include: separation of joints and trim; cracks in walls, floors, or concrete; and bowed or non-vertical walls. Some possible mitigation measures are maintaining separation between structures and runoff, using compact fill to shed water, not absorb it, and planting trees a distance equal to their mature height away from buildings to reduce root interference.

Several different types of soil expansion related to structures and infrastructure exist, which can include but are not limited to:

- Doming heave - upward, long-term, dome-shaped foundation movement that develops over many years,
- Cyclic heave - shrink and swell associated with seasonal or water leak events,
- Edge heave - damaging edge or dish-shaped heaving, and
- Lateral movement – lateral thrust of expansive soils.

5.3.16.2 History

In 1982, expansive soils were documented as the most costly natural hazard in the US, causing more damage than all other natural hazards combined, including earthquakes, floods, tornadoes and hurricanes. (FEMA 1982) Annual losses nationwide have been estimated between \$2 billion and \$9 billion. (Jones and Jones 1987) While expansive soils occur in Yamhill County, there have been no historic damages reported.

5.3.16.3 Location

In Yamhill County, approximately 35,000 acres contain soils with “moderate” to “high” rated shrink-swell potential, concentrated mainly in the east and south portions of the county.

Potential damages to structures from expansive soils in Yamhill County include: cracks in grade beams, walls, and drilled shafts; distortion and cracking of pavements and on-grade floor slabs; failure of steel or concrete blocks supporting grade beams; jammed or misaligned doors and windows; and buckling of basement and retaining walls due to lateral forces. Extensive damage can potentially result in the condemnation of structures. (US Army 1983)

Expansive soil locations are shown on Figures K-15 and K-15B (the City of Carlton is the only jurisdiction that identified expansive soils as a potential hazard).

5.3.16.4 *Extent*

The geographic extent of expansive soil events are directly dependant on the extent of clay-based expansive soil types and the size and type of moisture event that triggers the soil expansion. Another dependant factor for the extent is the amount and type of infrastructure that exists at the expansive soil location and near proximity, as well as the percentage volume change of the swelling or shrinking soil. The extent of expansive soil effects could be very local and limited to a single structure (i.e. resulting from a plumbing leak), or more landscape in nature due to a large area of soil moisture change (i.e. resulting from a large flood or storm event).

5.3.16.5 *Probability of Future Events*

Expansive soil events are difficult to predict because the location and time when water is available to the soil could happen at various periods in the life of a structure. Most soil expansion and associated structural damage has been shown to occur within five to eight years following construction. However, the effects of heave may also not be observed for many years until some change occurs in the foundation conditions to disrupt the moisture regime. (PCCDD 2006) The probability of damages increases for structures on expansive soils if the climate, effects of construction, and effects of occupancy promote moisture changes in the soil. (US Army 1983)

6. VULNERABILITY ANALYSIS

This section provides an overview of the vulnerability analysis and describes the five specific steps: asset inventory, methodology, data limitations and exposure analysis for current assets, and areas of future development. County- and city-specific asset inventory and exposure analysis tables are listed in Appendices A through J.

6.1 OVERVIEW OF VULNERABILITY ANALYSIS

A vulnerability analysis predicts the extent of exposure, and the impacts that may result from a hazard event of a given intensity in a given area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage. A vulnerability analysis is divided into five steps including asset inventory, methodology, data limitations, exposure analysis for current assets, and areas of future development.

The requirements for a vulnerability analysis as stipulated in DMA 2000 and its implementing regulations are described below.

- A summary of the community's vulnerability to each hazard that addresses the impact of each hazard on the community.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment]must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

6.2 VULNERABILITY ANALYSIS: SPECIFIC STEPS

6.2.1 Asset Inventory

An asset inventory is the first step of a vulnerability analysis. Assets throughout the County that may be affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates Yamhill County's existing building and infrastructure assets and insured values and are identified in detail in Appendix A. Jurisdiction-specific asset inventories are located in Appendices B-J.

Appendix A, Tables A-8 through A-10 (and respective jurisdiction-specific appendices B-J) portray the critical infrastructure numbers and values, and their potential vulnerability by hazard type.

Yamhill County seeks to protect its population by supporting Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk is mitigated.

6.2.1.1 Population and Building Stock

Population data for all of Yamhill County were obtained from the 2000 U.S. Census, which was collected at the census block level. Yamhill County's total population for 2000 was 84,992 and was estimated to be 90,310 for 2005, and the Portland State University estimated an increase to 93,083 for 2007. (Appendix A, Table A-6A) Jurisdiction-specific data are found in their respective Appendices B-J.

Estimated numbers of residential buildings and replacement values for those structures, as shown in Appendix A, were obtained from the 2000 U.S. Census. A total of 30,270 residential buildings valued at approximately \$4.43 Billion were considered in this analysis, including single-family dwellings, mobile homes, multifamily dwellings, temporary lodgings, and institutional dormitory facilities.

6.2.1.2 Repetitive Loss Properties

Repetitive loss properties are properties that suffer from repeated flooding. FEMA defines a RL property as a property with at least two \$1,000 claims within any 10-year period since 1978. SRL properties have been identified by FEMA as most at risk for repeat flooding. These properties include every property that since 1978 has experienced: four or more separate building and content claims (that are NFIP insured) each exceeding \$5,000 with cumulative claims exceeding \$20,000, or at least two separate building claims with cumulative losses exceeding the value of the property (that is, the value of the structure).

Table 6-1 shows general RL property data located within the county. Locations and addresses for both RL and SRL properties are not available for publication, however are kept on file with the Yamhill County Floodplain Coordinator.

Type	Community	Total Claims Since 1978	Flood Insurance	Value (\$) ¹	Total Claims (\$) ²
RL	City of McMinnville	2	Yes	4,973,200	223
RL	City of Newberg	1	Yes	1,160,000	0
RL	City of Sheridan	52	Yes	75,368,400	761,088
RL	City of Willamina	5	Yes	3,610,700	18,320
RL	Yamhill County	23	Yes	29,335,600	222,035

6.2.1.3 Critical Facilities and Infrastructure

A critical facility is defined as a local (non-State or Federal) facility in either the public or private sector that provides essential products and services to the general public, such as preserving the quality of life in Yamhill County and fulfilling important public safety, emergency response, and disaster recovery functions. The critical facilities profiled in this plan include the following:

- Local government facilities, such as departments, agencies, and administrative offices
- Emergency response facilities, including police, fire, and Emergency Operations Centers
- Educational facilities, including K-12
- Care facilities, such as congregate living health, residential care, and continuing care retirement facilities
- Community gathering places, such as parks, museums, libraries, and senior centers

The total number of county-identified critical facilities within the county is listed in Appendix A and shown on Figure K-16. The incorporated city-specific critical facilities are listed in Appendices B through J and Figures K-17 through K-25.

Similar to critical facilities, critical infrastructure includes infrastructure that is essential to preserving the quality of life and safety in the county. Critical infrastructure profiled in this plan includes the following:

- State and Federal Highways
- Railroad Tracks
- Local, State, and Federal bridges
- Utilities, including communication (cell, radio, and television), water and wastewater, and electrical facilities.

6.2.2 Methodology

A conservative exposure-level analysis was conducted to assess the risks of the identified hazards. This analysis is a simplified assessment of the potential effects of the hazards on values at risk without consideration of probability or level of damage.

Using census block level information, a spatial proportion was used to determine the percentage of the population and residential and nonresidential structures located where hazards are likely to occur. Census blocks that are completely within the boundary of a hazard area were determined to be vulnerable and were totaled. A spatial proportion was also used to determine the amount of linear assets, such as highways, within a hazard area. The exposure analysis for linear assets was measured in miles.

Replacement values or insurance coverage were developed for physical assets. These values were provided by the county and each jurisdiction. For facilities that didn't have specific values per building in a multi-building scenario (e.g., schools), the buildings were grouped together and assigned one value where available. Value information is not available for all critical facilities at

this time and will be collected as it becomes available. For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated.

A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

6.2.3 Data Limitations

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment as well as the use of approximations and simplifications that are necessary for a comprehensive analysis.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, and critical facilities and infrastructure to the identified hazards. It was beyond the scope of this MHMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the MHMP.

6.2.4 Exposure Analysis

The results of the exposure analysis for loss estimations in Yamhill County and each participating jurisdiction are located in Appendices A - J. Each appendix represents a jurisdiction and lists the critical facilities and the specific hazard areas in which each facility is located.

6.2.5 Areas of Future Development

Yamhill County and the participating jurisdictions represented in this MHMP seek to protect its population by supporting Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any proposed essential infrastructure component will undergo stringent review and design to ensure potential hazard risk is mitigated.

7. MITIGATION STRATEGY

This section outlines the four-step process for preparing a mitigation strategy including: developing mitigation goals, identifying mitigation actions, evaluating mitigation actions, and implementing mitigation action plans. The Steering Committees developed the mitigation goals and reviewed potential mitigation actions for the entire county and its nine incorporated cities. As such, county- and city-specific Mitigation Action Plans are provided in Appendices A through J.

7.1 DEVELOPING MITIGATION GOALS

The requirements for the local hazard mitigation goals, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy-Local Hazard Mitigation Goals	
Local Hazard Mitigation Goals	
Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	
Element	
<ul style="list-style-type: none"> Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards? (GOALS are long-term; represent what the community wants to achieve, such as “eliminate flood damage,” and are based on the risk assessment findings.) 	
Source: FEMA, July 2008.	

During the August 15 and 18, 2008 Risk Assessment Public meetings, the County and participating jurisdictions reviewed County and city-specific vulnerability analysis results as a basis for developing the mitigation goals and potential mitigation actions. (Appendices A-J)

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide visions. As such, the Steering Committee decided to keep their original goals (Table 7-1) reflected in their 2006 HMP focused to reduce or avoid long-term vulnerabilities to the identified hazards.

Table 7-1. 2009 Yamhill County Mitigation Goals

Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE

	<i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

7.2 IDENTIFYING MITIGATION ACTIONS

The requirements for the identification and analysis of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions	
Identification and Analysis of Mitigation Actions	
Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.	
Element	
<ul style="list-style-type: none"> ■ Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard? ■ Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure? ■ Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure? 	
Source: FEMA, July 2008.	

The Steering Committee met on September 2, 2008 to assess and revise a list of potential mitigation actions after finalizing the mitigation goals. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Appendix A, Table A-12 depicts the County's existing and newly considered mitigation actions developed during this mitigation plan update to support this MHMP update. The appendix further defines whether the existing actions were completed, deleted, deferred, or ongoing.

Appendices A through J contain County and jurisdiction-specific mitigation actions to reduce hazard impacts to new and existing buildings and infrastructure.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance	
National Flood Insurance Program (NFIP) Compliance	
Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.	
Element	

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

Yamhill County, and the Cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina, and Yamhill City all actively participate in the NFIP and have implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance. The City of Sheridan has exceeded NFIP minimum requirements to receive a Community Rating System (CRS) rating of “8.”

Each jurisdiction’s Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives. They subsequently selected and prioritized County or community appropriate actions to ensure an effective flood mitigation program. The County and jurisdictional appendices (A-J) describe their respective processes. Each jurisdiction also specifically addressed mitigation actions associated with RL properties.

7.3 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The requirements for the evaluation and implementation of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committees met on September 2, 2008 to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the jurisdiction-specific Mitigation Action Plans updated as outlined in Appendices A-J. The committees then met to determine the responsible agency and potential funding sources. The jurisdiction-specific Mitigation Action Plans represent mitigation projects and programs to be implemented through the cooperation of multiple entities.

The Steering Committees reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (Table 7-2) and the Benefit-Cost Analysis Fact Sheet (Appendix P) to consider the opportunities and constraints of implementing each particular mitigation action. The Steering Committees decided to assign a number to each STAPLEE category and subsequently added the applicable evaluation category number within the appropriate mitigation action’s “hazard type” (Appendices A-J).

Table 7-2. Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion “It is important to consider...”	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, State, and Federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, State, and Federal laws

Upon review, the Steering Committees assigned a high priority ranking to actions that best fulfill the goals of the MHMP and are appropriate and feasible for each jurisdiction and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined that only the existing and new mitigation actions that received a high priority ranking would be included in the Mitigation Action Plan. Appendices A-J depict the mitigation actions grouped by hazard and in descending priority order within each hazard.

7.4 IMPLEMENTING A MITIGATION ACTION PLAN

The requirements for the identification of a mitigation action for each participating jurisdiction, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions

Identification of Multi-Jurisdictional Mitigation Actions

Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

Element

- Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan?
- Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

Yamhill County, MHMP Appendix A, Table A-12 identifies “existing” mitigation action’s status (i.e. completed, deleted or deferred mitigation actions) and provided comments regarding those actions that were deferred or deleted. The table indicates “Ongoing” for those actions that were implemented and are now continuous initiatives.

The Mitigation Action Plan matrices state that the benefit-costs consideration will be determined once an action undergoes development, and how each mitigation action will be implemented and administered by the responsible entity where appropriate. Actions that Yamhill County will carry forward as ongoing actions are listed in blue text.

Eight of the nine incorporated cities followed this same process and developed city-specific Mitigation Action Plans. The jurisdiction-specific Mitigation Action Plans and prioritization methods used are provided in Appendices B through J.

Roadblocks to Implementing Mitigation Actions:

- All jurisdictions rely heavily on available and consistent programmatic funding to ensure existing programs remain viable. Fluctuations within these funding streams will dramatically affect each jurisdiction’s mitigation strategies. Reductions will severely limit successful mitigation action plan implementation.
- Permitting processes vary by jurisdiction and regulatory agency. There is no established clearinghouse or one-stop-shopping process. Coordinating between regulatory agencies like Fish and Game, the Department of Natural Resources, the Army Corps of Engineers, and other agencies can be cumbersome and time consuming. One jurisdiction stated it takes up to five years to successfully complete the permitting process.
- Limited available funding prevents preparing potential mitigation project Benefit/Cost Analysis prior to project development and submittal for grant application development.

8. PLAN MAINTENANCE

This section describes a formal plan maintenance process to ensure that the MHMP remains an active and applicable document. It includes an explanation of how Yamhill County and the Cities Steering Committees intend to organize their efforts to ensure that improvements and revisions to the MHMP occur in a well-managed, efficient, and coordinated manner.

The following three process steps are addressed in detail below:

- Monitoring, evaluating, and updating the MHMP
- Implementation through existing planning mechanisms
- Continued public involvement

8.1 MONITORING, EVALUATING, AND UPDATING THE MHMP

The requirements for monitoring, evaluating, and updating the MHMP, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Plan Maintenance Process - Monitoring, Evaluating, and Updating the Plan

Monitoring, Evaluating and Updating the Plan

Requirement §201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Element

- Does the new or updated plan describe the method and schedule for monitoring the plan, including the responsible department?
- Does the new or updated plan describe the method and schedule for evaluating the plan, including how, when and by whom (i.e. the responsible department)?
- Does the new or updated plan describe the method and schedule for updating the plan within the five-year cycle?

Source: FEMA, July 2008.

The MHMP was prepared as a collaborative effort among county and city staff and each jurisdiction's Steering Committee. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the County will use the Steering Committees to monitor, evaluate, and update the MHMP. Each participating jurisdiction will be responsible for implementing the county or city-specific Mitigation Action Plan. The Yamhill County Emergency Manager will serve as the primary point of contact and will coordinate all local efforts to monitor, evaluate, and update the MHMP.

The Yamhill County Emergency manager will contact each jurisdiction's Steering Committee leader to initiate an annual review one month prior to the adoption date anniversary. The findings from these reviews will be presented at the annual Steering Committee meeting. As shown in Appendix Q, the Annual Review Worksheet will provide the basis for possible changes to the overall MHMP Mitigation Plan and each jurisdiction-specific Mitigation Action Plan by refocusing on new or more threatening hazards, adjusting to changes to, or increases in, resource allocations, and engaging additional support for the MHMP implementation.

The Annual Review Worksheet, will also include an evaluation of the following:

- Participation of each jurisdiction and others in the MHMP implementation
- Notable changes in the County's risk to natural or human-caused hazards
- Impacts of land development activities and related programs on hazard mitigation
- Progress made with the Mitigation Action Plan's action items (for each jurisdiction) (identify problems and suggest improvements as necessary)
- The adequacy of available resources to enable MHMP implementation

Each participating jurisdiction will submit a Progress Report (Appendix Q) to the Steering Committee. The report will include the current status of the Mitigation Action Plan's mitigation projects, including any changes made to the projects, the identification of implementation problems and appropriate strategies to overcome them, and whether or not the project has achieved the appropriate goals identified in the plan. In addition to the annual review, the Steering Committee will update the MHMP every five years. To ensure that this update occurs, in the fourth year following adoption of the MHMP, the Steering Committees will undertake the following activities:

- Submit a request for eligible grant-funding for the MHMP update from the State of Oregon Division of Emergency Management.
- Encourage the City of McMinnville to join in the update process.
- Review FEMA MHMP update requirements for the new planning cycle.
- Thoroughly analyze and update the risk of natural and human-made caused hazards countywide.
- Provide a copy of the County and its participating jurisdictions' prior and current years annual reviews.
- Complete a detailed mitigation strategy review and revision.
- Update the Mitigation Action Plan for all participating jurisdictions identifying the status of the currently identified actions and adding newly considered, prioritized, and assigned actions.
- Prepare a new draft MHMP and submit it to the appropriate governing body for review.
- Submit an updated MHMP to the Oregon Division of Emergency Management and FEMA for review.
- Present MHMP with FEMA's "Conditional Approval" to the County Board and City Councils for adoption.
- Return a copy of the finalized MHMP with adoption resolutions from all participating jurisdictions to FEMA to finalize FEMA's approval.

8.2 IMPLEMENTATION THROUGH EXISTING PLANNING MECHANISMS

The requirements for implementation through existing planning mechanisms, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Plan Maintenance Process - Incorporation into Existing Planning Mechanisms

Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Element

- Does the new or updated plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?
- Does the new or updated plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?
- Does the updated plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?

Source: FEMA, July 2008.

The original 2006 Natural Hazard Mitigation Plan called for a steering committee to be convened on a periodic basis to focus efforts on maintaining the plan and implementing the mitigation strategy and applicable initiatives. These actions were scheduled to occur in 2008 however, the County Emergency Manager's resignation has delayed this action. The newly hired emergency manager will begin to implement this step as soon as possible.

Existing programs continue to address statewide planning goals and legislative requirements. The County's comprehensive land use plan, capital improvement plan, mandated standards and building codes currently address identified mitigation initiatives and code compliance requirements. The County strives to incorporate mitigation actions into existing programs and procedures as the opportunity arises.

Table 3 in each of the jurisdiction-specific appendices identifies the local planning mechanisms and regulatory tools available for incorporating the mitigation requirements of the mitigation plan.

The Steering Committees, after MHMP adoption, will ensure the MHMP and each jurisdiction's Mitigation Action Plan is incorporated into existing planning mechanisms. Each member will achieve this incorporation by undertaking the following activities:

- Conduct a review of the community-specific regulatory tools to assess the schedule for integration of the mitigation strategy. These regulatory tools are identified in each capability assessment presented in Appendices A through J.
- Work with pertinent community departments and agencies to increase MHMP awareness and provide assistance in integrating the mitigation strategy into relevant planning mechanisms. Implementation of these requirements may require updating or amending specific planning mechanisms.

There were no specific documents identified that had incorporated the results of the original 2006 HMP. However, the Steering Committee members are now aware of the resources available in this updated document and how they can be utilized to enhance other planning activities.

8.3 CONTINUED PUBLIC INVOLVEMENT

The requirements for continued public involvement, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Plan Maintenance Process - Continued Public Involvement

Continued Public Involvement

Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

Element

- Does the new or updated plan explain how continued public participation will be obtained? (For example, will there be public notices, an ongoing mitigation plan committee, or annual review meetings with stakeholders?)

Source: FEMA, July 2008.

Yamhill County and each of the participating jurisdictions within the County are dedicated to involving the public directly in the continual reshaping and updating of the MHMP. Electronic and hard copies of the MHMP will be provided to the Yamhill County Emergency Manager and each City. In addition, a downloadable copy of the MHMP will be posted on the County website with any proposed changes. This site will also contain an e-mail address and phone number to which people can direct their comments or concerns.

The Yamhill County Emergency Manager and each Steering Committee will also identify opportunities to raise community awareness about the MHMP and the hazards that affect the participation jurisdictions. This effort could include attendance and provision of materials at County, city, and school-sponsored events, through Red Cross venues, and the Yamhill County Fire Safe Council outreach programs, and public mailings. Any public comments received regarding the MHMP will be collected by the Yamhill County Emergency Manager, included in the annual report, and considered during future MHMP updates.

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Appendix A

Yamhill County

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This appendix contains specific Yamhill County information to support the 2009 Multi-Jurisdictional Hazard Mitigation Plan update.

This section further supports the County's planning process by summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

Yamhill County is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill that goal, the County organized a Hazard Mitigation Plan development Steering Committee dedicated to identifying hazard threats and developing actions that can be taken to mitigate damage and life losses from those threats.

Table A-1 contains the County's Steering Committee participant list for the Yamhill County MHMP planning elements.

Table A-1. Yamhill County Steering Committee	
Name	Agency/Department/Affiliation
Doug McGillivray	County Emergency Manager (Current)
Laura Tschabold	County Administrator
John Boyington	Emergency Manager
Karen McFaddin	Emergency Management
Janean Douglasz	Emergency Management
Jennifer Busey	Administrative Assistant

Table A-2 contains a summary of the County's public involvement and planning meeting activities.

Table A-2. The Yamhill County Public Involvement Mechanisms	
Mechanism	Description
Kick-off Meeting – Email notice to jurisdictions	April 14, 2008 Planning Process Kick-Off Meeting
Newsletter mailed county-wide with utility bills	April 2008 Project Introduction and Request for Public Participation (hazard screening)
Newspaper notice & newsletter distribution through utility bills	August 15/18, 2008 Public Meeting, Draft Risk Assessment Review

CAPABILITY ASSESSMENT

Table A-3, A-4, and A-5 contain the County's resources used to support planning activities, including the reports and studies reviewed as part of the update process.

Table A-3. Yamhill County Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Emergency Operations Plan	Identifies emergency planning, policies, procedures, and response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies.
	Comprehensive Plan	Defines County governance, responsibilities, land use, zoning and delineates agency areas of responsibilities
	Transportation Plan	Describes long range use and future development of the transportation system.
	Zoning Plan	Describes current and future zoning initiatives
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies (Municipal Codes)	Land Use Ordinances	Defines land use regulations, requirements and use, and identifies floodplain areas
	Zoning Ordinances	Defines building use zones and identifies floodplain areas

Table A-4. Yamhill County Administrative and Technical Resources for Hazard Mitigation	
Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Engineer Planner
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Engineer
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Planner
Floodplain manager	State Flood Plain Manager: Christine Shirley
Personnel skilled in GIS and/or HAZUS-MH	County GIS
Director of Emergency Services	Emergency Manager County Fire Defense Board
Finance (grant writers, purchasing)	Finance Manager
Public Information Officers	Emergency Manager Health Sherriffs

Table A-5. Yamhill County Financial Resources for Hazard Mitigation	
Financial Resources	Effect on Hazard Mitigation
General funds	Case-by-case
Authority to levy taxes for specific purposes	yes
Incur debt through general obligation bonds	unknown
Incur debt through special tax and revenue bonds	unknown
Incur debt through private activity bonds	unknown
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which is available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards	
Identifying Hazards	
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.	
Element	
■ Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	
Source: FEMA, July 2008.	

The Yamhill County Steering Committee determined that the following hazards could potentially threaten the County. Those identified with an (*) are new hazards identified through the 2009 update process.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	X
Wind	X
Erosion*	X
ENSO (El Niño / La Niña)*	X
Expansive Soils*	X
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	X
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	X
Infectious Disease Epidemic*	X

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes County specific vulnerability information. It comprises:

- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment]must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS:

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets throughout the County that may be affected by hazard events include population, residential and nonresidential buildings, and critical facilities and infrastructure. The Steering Committee made appropriate changes throughout the 2009 plan update process.

The asset inventory delineates Yamhill County's existing building and infrastructure assets and insured values and are identified in detail in Table A-7.

Tables A-8, A-9, and A-10 portray the critical infrastructure numbers and values, and their potential vulnerability by hazard type.

Yamhill County seeks to protect its population by supporting Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table A-6A were obtained from the 2000 U.S. Census and Portland State University. It comprises census block level data, and estimates from university conducted community research.

The County's existing building, infrastructure, and insured values are identified in Tables A-5, A-6, and A-7.

Table A-6A. Yamhill County Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census³	Total Building Count	Total Value of Buildings (\$)¹
85,500	90,310	93,085	30,270	\$5,779,076,696 ²

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$146,500 per structure).

² Yamhill county Taxing Districts: http://www.co.yamhill.or.us/assessor/Documents/2007_Taxing_Districts.pdf

³ Portland State University (PSU) 2007 Oregon Population Report.

Table A-6B. Yamhill County NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties²
Yamhill County	91,917	86	147	29,335,600	625.29	23	222,035	1

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

²Content and building claims.

Table A-7. Yamhill County Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Government	Yamhill County Public Works	2060 Lafayette Ave.	Unknown
	Yamhill County Public Works	2060 Lafayette Ave.	Unknown
	Yamhill County Fairgrounds	2070 Lafayette Ave., McMinnville	Unknown
	Yamhill County Dog Control	2070 Lafayette Avenue, McMinnville	Unknown
	Evergreen-Doe Humane Society	NE 15 th Street, McMinnville	Unknown
	Yamhill County Courthouse	535 NE Fifth Street	Unknown
	Yamhill County Jail	535 NE Fifth Street	Unknown
	Yamhill County SO	535 NE Fifth Street, McMinnville	Unknown
	Yamhill County EM	414 NE Evans Street, McMinnville	Unknown
Educational	Wascher Elementary School	986 East Seventh Street	Unknown
	Buel Elementary	1985 SE Davis Street	Unknown
	Columbus Elementary	1600 SW Fellows Street	Unknown
	Cook Elementary	800 NE Lafayette Avenue	Unknown
	Grandhaven Elementary	3200 NE McDonald Lane	Unknown
	Memorial Elementary	501 West 14 th Street	Unknown
	Newby Elementary	1125 West Second Street	Unknown
	Antonia Crater Elementary School	203 West Foothills	Unknown
	Edwards Elementary School	715 East Eighth Street	Unknown
	Ewing Young Elementary School	17600 NE North Valley Road	Unknown
	Joan Austin Elementary	2200 North Center Street	Unknown
	Mable Rush Elementary	1441 Deborah Road	Unknown
	Perrydale School	7445 Perrydale Road	Unknown
	Faulconer Chapman School	332 SW Cornwall Street	Unknown
	Duniway Middle School	575 Michelbook Lane	Unknown
	Patton Middle School	1175 East 19th	Unknown
	Chehalem Valley Middle School	403 West Foothills	Unknown
	Mountain View Middle School	2015 North Emery Drive	Unknown
	Yamhill-Carlton Union High School	275 North Maple Street	\$42,933
	Bethel Christian School	325 NW Baker Creek Road	Unknown
	McMinnville Adventist Christian School	1349 NW Elm Street	Unknown
	McMinnville Montessori School	1101 SE Brooks Street	Unknown
	Saint James Catholic School	206 NE Kirby Street	Unknown

Table A-7. Yamhill County Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	St. John Lutheran School	2142 NE McDonald Lane	Unknown
	CS Lewis Academy	200 South College Street	Unknown
	Open Bible Christian School	1605 North College Street	Unknown
	Veritas Classical Christian School	401 Mission Drive	Unknown
	West Valley Academy	9015 DeJong Road, Amity	Unknown
	The Delphian School	20950 SW Rock Creek Road	Unknown
	Pioneer Christian School	885 SW Hill Drive	Unknown
	Chemeketa Community College	500 NW Hill Road, McMinnville	Unknown
	George Fox University	414 North Meridian Street, Newberg	Unknown
	Linfield College	900 NE Baker Street, McMinnville	Unknown
Care Facility	Willamette Valley Medical Center	2700 SE Stratus Avenue McMinnville	Unknown
	Providence Newberg Medical Center	1003 Providence Drive Newberg	Unknown
	McMinnville Immediate Health Care	321 N. Hwy 99W Suite B	Unknown
	Newberg Urgent Care	2880 Hayes Street	Unknown
Community	Northwest Senior & Disability Services	300 SW Hill Road McMinnville	Unknown
		2250 NE McDaniel Lane McMinnville	Unknown
		101 West Foothills, Newberg	Unknown
		917 South Bridge Street, Sheridan	Unknown
	Hillside Retirement Community	440 NW Hillside Parkway	Unknown
	Osprey Court Memory Care	320 SW Hill Road	Unknown
	Osprey Point Assisted Living	345 SW Hill Road	Unknown
	Parkland Village	3121 NE Cumulus Avenue	Unknown
	Villas of McMinnville	775 NE 27 th Street	Unknown
	Windfield Village	345 SW Hill Road	Unknown
	Astor House at Springbrook	3801 Hayes Street	Unknown
	Chehalem Springs Assisted Living	3802 Hayes Street	Unknown
	Friendsview Retirement Community	1301 East Fulton	Unknown
	Golden Villa Retirement Center	700 East Fifth Street	Unknown
	Huffman House	1307 North College	Unknown
	Deer Meadow Assisted Living	1350 West Main Street	Unknown
	Evergreen Aviation Museum	500 NE Captain Michael King Smith Way, McMinnville	Unknown
	YCAP	800 NE Second Street, McMinnville	Unknown

Table A-7. Yamhill County Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	CVSCC (Chehalem Valley Senior Citizen Council)	125 South Elliott, Newberg	Unknown
State and Federal Highways	Hwy 99W		
	Hwy 18		
	Hwy 47		
	Hwy 240		
Railroads	Willamette & Pacific Railroad	<i>741 NE Third Street, McMinnville</i>	
Bridges	3-Mile Lane Bridge	<i>McMinnville Connects to Hwy 18</i>	Unknown
	“Green” Bridge, Sheridan	Connects to Hwy 18	Unknown
Transportation Facilities	Cirrus Aviation	4000 SE Cirrus Avenue, McMinnville	Unknown
	Sportsman Airpark	<i>504 S. Airpark Way, Newberg</i>	Unknown
	Wheatland Ferry	Crossing Willamette River	Unknown
	Riverbend Landfill Co.	<i>13469 SE Hwy 18, McMinnville</i>	Unknown
	Boneville Power Administration	14297 Pike Road NW, Yamhill	Unknown
	McMinnville Water & Light	855 NE Marsh Lane	Unknown
	Portland General Electric	130 SW Monroe, Sheridan	Unknown
Dams	Haskins Reservoir/Dam		Unknown
	McGuire Reservoir/Dam		Unknown
	Stormy Mountain Reservoir		Unknown

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is thoroughly discussed in the main body of the Yamhill County MHMP, Section 6, which generated the following Hazard Exposure Analysis Overview. Tables A-8, A-9, and A-10 depict in tabular form results obtained from the GIS analysis depicted in hazard figures located in Appendix K.

Table A-8. Yamhill County Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$)¹	Number	Value (\$)¹
Flood	Moderate	500-year floodplain	15,676	10,811	1,583,811,500	78	unknown
	High	100-year floodplain	30,104	10,232	1,498,988,000	77	unknown
Winter Storm		descriptive	93,085	30,270	4,425,474,000	unknown	unknown
Landslide	Moderate	14-32 degrees	51,537	16,870	2,471,455,000	112	unknown
	High	>32 degrees	26,643	9,776	1,432,184,000	45	unknown
Wildland Fire	Moderate	Moderate fuel rank	86,617	27,582	4,040,763,000	243	unknown
	High	High fuel rank	69,321	22,617	3,313,390,500	190	unknown
	Very High	Very high fuel rank	28,746	10,678	1,564,327,000	59	unknown
	Extreme	Extreme fuel rank	10,851	4,323	63,3319,500	18	unknown
Earthquake	Strong	9-20% (g)	86,627	27,566	4,038,419,000	243	unknown
	Very strong	>20-40% (g)	526	212	31,058,000	0	unknown
	Severe	>40-60% (g)	0	0	--	0	unknown
Volcano		descriptive	93,085	30,270	4,425,474,000	unknown	unknown
Wind		descriptive	93,085	30,270	4,425,474,000	unknown	unknown
Erosion		300' buffer	--	--	--	unknown	unknown
El Nino and La Nina		descriptive	93,085	--	--	unknown	unknown
Expansive Soils	Low	<3% percent	--	824	120,716,000	4	unknown
	Moderate	3-6%	--	0	--	0	unknown
	High	6-9%	--	0	--	0	unknown
	Very High	>9%	--	0	--	0	unknown
Drought		descriptive	--	--	--	unknown	unknown
Dam Failure ⁽¹⁾	Significant	NID	--	--	--	unknown	unknown
Disruption of Utility and Transportation Systems		descriptive	93,085	--	--	unknown	unknown

Table A-8. Yamhill County Potential Hazard Exposure Analysis Overview-Population and Buildings

Table A-8. Yamhill County Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$)¹	Number	Value (\$)¹
Hazardous Material Event (2)	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	52,355	16,502	2,417,543,000	209	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--
Terrorism		descriptive	93,085	--	--	--	--
Infectious Disease Epidemic		descriptive	93,085	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$146,500 per structure).

Note-population by parcel was not available at the time this document was prepared. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed. ¼-mile buffered EHS sites were unable to be determined due to the use of census block data.

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Table A-9. Yamhill County Potential Hazard Exposure Analysis Overview-Critical Facilities												
			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--	2	unknown
	High	100-year floodplain	--	--	--	--	1	unknown	--	--	3	unknown
Winter Storm		descriptive	9	unknown	--	--	33	43K	4	unknown	16	unknown
Landslide	Moderate	14-32 degrees	--	--	--	--	3	unknown	--	--	4	unknown
	High	>32 degrees	--	--	--	--	--	--	--	--	1	unknown
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	--	--	--	--	--	--
	High	High fuel rank	4	unknown	--	--	14	unknown	2	unknown	--	--
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	9	unknown	--	--	33	43K	4	unknown	16	unknown
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	9	unknown	--	--	33	43K	4	unknown	16	unknown
Wind		descriptive	9	unknown	--	--	33	43K	4	unknown	16	unknown
Erosion		300' buffer	--	--	--	--	--	--	--	--	--	--
El Nino and La Nina		descriptive	9	unknown	--	--	33	43K	4	unknown	16	unknown
Expansive Soils	Moderate	3-6%	--	--	--	--	6	unknown	--	--	2	community
	High	6-9%	--	--	--	--	--	--	--	--	--	--
	Very High	>9%	--	--	--	--	--	--	--	--	--	--
Drought		descriptive	9	unknown	--	--	33	43K	4	unknown	16	unknown
Dam Failure ⁽¹⁾		Inundation area	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	9	unknown	--	--	33	43K	4	unknown	16	unknown
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	9	unknown	--	--	20	42K	4	unknown	14	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	8	unknown	--	--	20	42K	3	unknown	14	unknown
Terrorism		descriptive	9	unknown	--	--	33	43K	4	unknown	16	unknown
Infectious Disease Epidemic		descriptive	9	unknown	--	--	33	43K	4	unknown	16	unknown

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Table A-10. Yamhill County Potential Hazard Exposure Analysis Overview-Critical Infrastructure														
			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)¹	Miles	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	1	unknown	1	unknown	--	--	--	--
	High	100-year floodplain	--	--	--	--	1	unknown	4	unknown	--	--	2	unknown
Winter Storm		descriptive	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown
Landslide	Moderate	>14-32 degrees	--	--	--	--	1	unknown	3	unknown	--	--	2	unknown
	High	>32 degrees	--	--	--	--	--	--	1	unknown	--	--	2	unknown
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
	High	High fuel rank	--	--	--	--	1	unknown	3	unknown	--	--	2	unknown
	Very High	Very high fuel rank	--	--	--	--	--	--	2	unknown	--	--	2	unknown
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--	1	unknown
Earthquake	Strong	9-20% (g)	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown
Wind		descriptive	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown
Erosion		300' buffer	--	--	--	--	--	--	--	--	--	--	--	--
El Nino and La Nina		descriptive	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown
Expansive Soils	Moderate	3-6%	--	--	--	--	1	unknown	2	unknown	--	--	--	--
	High	6-9%	--	--	--	--	--	--	--	--	--	--	--	--
	Very High	>9%	--	--	--	--	--	--	--	--	--	--	--	--
Drought		descriptive	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown
Dam Failure ⁽¹⁾		Inundation area	--	--	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	4	unknown	1	unknown	2	unknown	4	unknown	--	--	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	4	unknown	1	unknown	--	--	4	unknown	--	--	1	unknown
Terrorism		descriptive	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown
Infectious Disease Epidemic		descriptive	4	unknown	1	unknown	2	unknown	7	unknown	--	--	3	unknown

Total miles for highways and railroads were not provided. Numbers represent number of segments.

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SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section provides a summary of County vulnerabilities and impacts from natural hazards in addition to the identified technological and manmade hazards in the 2009 Yamhill County MHMP.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for Yamhill County. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In Yamhill County, 10,232 residential structures (worth \$1.5B), 77 non-residential structures (value unknown), one educational facilities (values unknown), three community facilities (values unknown), four transportation facilities (values unknown), one bridge (value unknown) and two dams (value unknown) are located within the boundaries of the 100-year floodplain and therefore accorded a high risk.

The 500-year floodplain contains 10,811 residential structures (worth \$1.58B), 78 non-residential structures (value unknown), two community facilities, one transportation facility and one bridge (values unknown) which are considered to have a moderate risk.

Winter Storm

Winter storms have widespread impacts that are most often the result of the ice, cold, high winds and flooding they bring. Damage to facilities and infrastructure can be severe, depending on the intensity of the storm event.

Winter storms are regional events and a single event is capable of impacting all people, critical facilities, and infrastructure within Yamhill County. While there will be differences based on geography and topography, these variations are difficult to predict in advance. Higher amounts of precipitation in the form of snow tend to fall at higher elevations, while freezing rain more often impacts lower areas in the county. However, flooding resulting from increased snow fall would be most severe downstream. Different weather patterns can affect different areas throughout the county in different manners, and at different times impacts from a regional event such as a snow storm can be spread out temporally as well as spatially. Therefore the entire population (93,085 residents), including 30,270 residential structures (worth \$4.42B), (est) 243 non-residential structures (value unknown), 9 government facilities (value unknown), 33 educational facilities (worth \$43K), 4 care facilities (value unknown), 16 community facilities (value unknown), 4 highways (value unknown), 1 railroad (value unknown), 7 transportation facilities (value unknown), 2 bridges (value unknown), and 3 dams (value unknown) are considered to be at risk.

Landslide

The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and wastewater utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

USGS elevation datasets were used to determine the landslide hazard areas within Yamhill County. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, Yamhill County has 16,870 residential structures (worth \$2.47B), 112 non-residential structures (value unknown), three educational facilities (value unknown), four community facilities (value unknown), three transportation facilities (value unknown), one bridge (value unknown) and two dams (value unknown) located in areas of moderate risk.

There are 9,776 residential structures (worth \$1.43B), 45 non-residential structures (value unknown), one community facility (value unknown), one transportation facility (value unknown), one bridge (value unknown), and two dams (value unknown) located in areas of high risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

Yamhill County has critical facilities and infrastructure located within areas with moderate, high, very high, and extreme fuel ranks. Moderate fuel rank areas contain 27,582 residential structures (worth \$4.04B), 243 non-residential structures (value unknown), nine government facilities (value unknown), 29 educational facilities (worth \$42K), four care facilities (value unknown), six ground and air facilities (value unknown), two bridges (value unknown), and two dams (value unknown).

High fuel rank areas contain 22,617 residential structures (worth \$3.31B), 190 non-residential structures (value unknown), four government facilities (value unknown), 14 educational facilities (value unknown), two care facilities (value unknown), three transportation facilities (value unknown), one bridge (value unknown), and two dams (value unknown).

Very high fuel rank areas contain 10,678 residential structures (worth \$1.56B), 59 non-residential structures (value unknown), two transportation facilities (value unknown), and two dams (value unknown).

Extreme fuel rank areas contain 4,323 residential structures (worth \$63.3M), 18 non-residential structures (value unknown), and one dam (value unknown).

Earthquake

Based on PGA shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas, however, is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable slopes. As well as landslide, earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The eastern portion of Yamhill County is a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak acceleration of the ground caused by the earthquake, and a strong designation corresponds to 9-20 percent of the acceleration of gravity while a very strong designation corresponds to >20-40 percent of the acceleration of gravity.

There are 27,566 residential structures (worth \$4.03B), 243 non-residential structures (value unknown), 9 government facilities (value unknown), 33 educational facilities (worth \$43K), 4 care facilities (value unknown), 16 community facilities (value unknown), 4 highways (value unknown), 1 railroad (value unknown), 7 transportation facilities (value unknown), 2 bridges (value unknown), and 3 dams (value unknown) which can experience strong shaking.

There are 212 residential structures (worth \$31.05M) and no critical facilities located in regions expected to experience very strong shaking.

Volcano

As discussed in Chapter 5, volcanic activity is most likely to impact Yamhill County in the form of ashfall or tephra. Damage is likely to result from volcanic eruption columns and clouds which contain volcanic gases, minerals, and rock. The columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat, and can distribute acid rain as sulfur dioxide gas mixes with water. Additionally, these particles can create a risk of suffocation as carbon dioxide is heavier than air and collects in valleys and depressions threatening human and animals. They further pose a toxic threat from fluorine which clings to ash particles potentially poisoning grazing livestock and contaminating domestic water supplies.

Buildings, streets, and roads throughout the entire county would require minor cleanup with negligible impacts. Temporary utility interruptions are likely, and minor cleanup may be required for electrical and other utility services. Water treatment facilities may require additional attention to address high turbidity water. Injuries associated with respiratory problems may result.

Due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability, although it can be assumed that the entire population (93,085 residents), including 30,270 residential structures (worth \$4.42B), (est) 243 non-residential structures (value unknown), 9 government facilities (value unknown), 33 educational facilities (worth \$43K), 4 care facilities (value unknown), 16 community facilities (value unknown), 4 highways (value unknown), 1 railroad (value unknown), 7 transportation facilities (value unknown), 2 bridges (value unknown), and 3 dams (value unknown) are considered to be at risk.

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

Within Yamhill County, this corresponds to the eastern portion of the county, in the Willamette Valley. However, strong winds are often associated with higher elevations, such as those found in the eastern portion of the County; therefore all of Yamhill County is considered to be susceptible to a windstorm event. The entire population (93,085 residents), including 30,270 residential structures (worth \$4.42B), (est) 243 non-residential structures (value unknown), 9 government facilities (value unknown), 33 educational facilities (worth \$43K), 4 care facilities (value unknown), 16 community facilities (value unknown), 4 highways (value unknown), 1 railroad (value unknown), 7 transportation facilities (value unknown), 2 bridges (value unknown), and 3 dams (value unknown) are considered to be at risk.

Erosion

Riverine erosion rarely causes death or injury. However, erosion causes significant destruction of property, development, and infrastructure. Erosion hazard data is not readily available; however, descriptions of several localized areas were identified during the development of this document and are identified only by location on a map referencing the river or stream reach described. Critical facilities that may be at risk of erosion were identified using a 300 foot-buffer in the areas identified as having historic erosion impacts to conservatively account for building footprints.

No county-owned critical facilities were identified to be at risk from erosion impacts.

ENSO (El Niño and La Niña)

ENSO (El Niño and La Niña) events cause large scale weather pattern changes throughout Yamhill County, and across the entire State of Oregon. In Yamhill County, El Nino periods are generally drier, with an increased likelihood of drought, while La Nina periods tend to be wetter and colder, with an increased risk of winter storm and the associated hazards it brings, particularly flooding and landslides.

The changes wrought by ENSO are on a very large scale, so it is difficult to quantify their impacts locally. Instead, ENSO is manifested in the hazards it influences, such as winter storms,

flooding, landslides and drought. Therefore, the quantitative impacts have been summarized in those categories.

Expansive Soils

Shrinking and swelling soils can lead to damaged foundations and structures. The most common damage includes cracking and loss of integrity of building foundations and walls of residential and light (one-or two-story) buildings, highways, canal and reservoir linings, and retaining walls. (PCCDD 2006, US Army 1983)

Using NRCS soils data, risk for shrink-swell potential was calculated using the linear extensibility of moderate (3-6 percent), high (6-9 percent), and very high (greater than 9 percent).

Yamhill County has 824 residential structures (worth \$120.7B) and four non-residential structures (value unknown) located in low expansive soils areas. There are six educational facilities, two community facilities, two ground and air facilities and one bridge (all values unknown) located in expansive soils moderate (3-6 percent) risk areas.

Drought

State-wide droughts have historically occurred in Oregon, and as it is a region-wide phenomenon, all residents are equally at risk. Structural damage from drought is not expected; rather the risks apply to humans and resources. Industries important to Yamhill County's local economy such as agriculture, fishing, and timber have historically been affected, and any future droughts would have tangible economic and potentially human impacts.

Dam Failure

Dam inundation data is unavailable for Yamhill County, therefore it is not possible to assess the impacts due to dam failure in this region using that method. Of the 30 dams listed in the National Inventory of Dams, 23 are privately owned, six are owned by local government, and one is a public utility. However, only three dams are considered a concern by the cities participating in this study, two of which do not meet NID's criteria.

The City of Sheridan's Stony Mountain Impoundment Facility is a spring-fed reservoir, retained by an earthen dam approximately 10 miles outside of town. The emergency spillway empties into La Toutena Mary Creek. The dam embankment, if breached, will spill into a La Toutena Mary Creek tributary, and the flood hydrograph will travel 3.37 miles to the La Toutena Mary Creek and East Creek confluence, with an additional 3.15 miles to East Creek's confluence with Willamina Creek. Based on a clear day piping failure stimulated by the City of Sheridan, if the dam embankment was breached, it would take approximately 35 minutes for the dammed water to travel the 3.37 miles to the East Creek confluence and an additional 100 minutes to travel to the Willamina Creek confluence.

Under normal conditions, the flood wave would start with approximately 10,670 cubic feet per second (cfs) at the dam and end with approximately 1,090 cfs at Willamina Creek. Due to the limited size of the watershed, the limited inflow to the reservoir, and the height of the dam compared to the emergency spillway (1,657 feet vs. 1,653 feet), an overtopping failure is unlikely. Thus, a catastrophic failure of the dam would not present a threat to human life

downstream. Neither the road nor any residential structures would likely be inundated by the flood wave generated by a piping failure.

Even when the clear-day scenario was tested using more extreme assumptions, such as increased water levels, a dam failure still did not pose a threat to residential structures. Possible developments that could cause piping failure include rapid drawdown, seismic activity, or slope failure. As water flows through the dam, the passage could continue to grow as material is eroded away. Eventually the size of the passage could compromise the structural integrity of the dam and cause it to collapse. (City of Sheridan Dam Failure Analysis, 2007)

The City of Carlton's Panther Creek Reservoir is approximately 8 miles west of town. The drainage basin above the dam is approximately 3.19 square miles. There has been some erosion caused by tree removal activities by local landowners during the rainy season. There is a main 4.5 mile long 10-inch diameter transmission line to the city, which includes a 6-inch emergency connection with the McMinnville Water and Light main transmission line. However, no agreement exists as to the when the connection can be used. (City of Carlton Citizen Involvement and Land Use Planning, 1999)

The City of Willamina's Dam is an earthen dam located approximately 12 miles north of town. It is expected that a dam failure would affect the city by causing a mud flow down Willamina Creek. There is also a moderate concern of debris flowing down the Willamina Creek in the case of a dam failure of the City of Sheridan's Stony Mountain Impoundment Facility.

Due to the lack of inundation data, there have not been any county-owned critical facilities identified as being at risk of dam inundation.

Disruption of Utility and Transportation Systems

Transportation system disruption impacts range from effects on life, health, and safety (in the form of emergency vehicle mobility, access to hospitals, access to evacuation routes, and access to vital supplies if transport is seriously disrupted for an extended period) to the economic effects of delays, lost commerce, and lost time.

Similarly, disruption of utility systems can affect Yamhill County in terms of commerce and recreation as well as at fundamental health and safety level. Countywide disruptions are likely to impact all residents equally. Structural damage from disruption to these systems is not expected; rather the risks apply to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the EPA's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses that generate hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and all facilities within a 0.25 miles radius of EHS sites are considered at risk. In general, this corresponds to main transportation arteries throughout the county.

In Yamhill County, 16,502 residential structures (worth \$2.42B), 209 non-residential structures (value unknown), nine government facilities (value unknown), 20 educational facilities (worth \$42K), four care facilities (value unknown), 14 community facilities (value unknown), four

highways (values unknown), one railroad (value unknown), two bridges (values unknown) and four transportation facilities (value unknown) are located within the 0.25 mile risk radius.

Eight government facilities (value unknown), 20 educational facilities (worth \$42K), three care facilities (value unknown), 14 community facilities (value unknown), four highways (values unknown), one railroad (value unknown), one dam (value unknown), and four transportation facilities (value unknown) are located within the 0.25-mile buffered EHS sites.

Terrorism

It is difficult to determine the scope of any terrorist threat to Yamhill County. Although there seem to be few high-profile targets present, it is impossible to predict future terrorist events. Depending on the extent of the action, the community may suffer economic loss, disruption of utilities, and cleanup relating to explosions and other facility damages. All facilities and residents are at equal risk of being impacted by this threat, with increased risk near urban centers.

Infectious Disease Epidemic

The consequences of a pandemic as described in Chapter 5 could be devastating. In the event of a poor-fit vaccine or very limited vaccine supply, the public health measures that would work best include: isolation and quarantine; restricting movement between and within communities; prohibiting public gatherings and group activities; and closing schools.

The county and state have isolation and quarantine laws; cities can also apply quarantines and restrict public movement in a public health emergency. The recently passed public health emergency law in Oregon provides a process for such mechanisms to be implemented. (L. Rivers, personal communication; K. Ladd, personal communication)

Impacts associated with infectious disease epidemics in general have the potential to include loss of life and shutdown of critical facilities. Furthermore, an epidemic level of infectious disease in the community could overwhelm local resources, although there are no structural risks or losses associated with this hazard. The entire population of 93,085 is at risk from the effects of an infectious disease epidemic.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines identification and analysis of mitigation actions as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The County proceeded to evaluate potential mitigation actions once they reviewed their existing Mitigation Goals (Section 7.1) and determined their applicability to current needs.

Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Table A-12 depicts the County's newly identified and "considered" mitigation actions developed during this mitigation planning process and their existing mitigation action status (completed, deleted, deferred, and ongoing). The revised list in Table A-14 delineates those actions the County will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

As stated within the MHMP, Yamhill County, and the Cities of Amity, Carlton, Dayton, Dundee, Lafayette, Newberg, Sheridan, Willamina, and Yamhill City all actively participate in FEMA's NFIP and have implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance. The City of Sheridan has exceeded NFIP minimum requirements to receive a Community Rating System (CRS) rating of "8."

Each jurisdiction's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing RL properties to assure an effective flood mitigation program.

MITIGATION ACTION ITEMS CONSIDERED

Table A-12. 2009 Yamhill County Mitigation Actions - Existing and Newly Considered (Blue text items are the County's pre-identified Mitigation Action Items-2006 HMP) Items marked with an asterisks (*) are a priority for the County.			
Hazard / Priority	Status <i>(Complete, Deferred, Deleted, Ongoing)</i>	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
Multi-Hazard *	<i>New</i>		Develop, produce, and distribute information materials concerning mitigation, preparedness and safety procedures for all natural hazards.
Multi-Hazard (14) *	Ongoing		Review and update the Yamhill County Emergency Operations Plan and the Natural Hazards Mitigation Plan on an annual basis. Conduct a complete review of the plans and have then officially promulgated by the BOC every five years.
Multi-Hazard (1)	Ongoing		Provide assistance to incorporated communities and special districts in development of Natural Hazards Mitigation Plans.
Multi-Hazard (2)	Ongoing		Consider the goals and action items from the Yamhill County Natural Hazard Mitigation Plan for implementation in other county documents and programs, where appropriate.
Multi-Hazard (3))	Deferred	Lack funding and staff availability	Evaluate the effectiveness of existing programs and identify shortcomings in natural hazard mitigation. Balance the objectives of program goals with natural hazard mitigation.
Multi-Hazard (4)	Deferred	Lack funding and staff availability	Identify funding opportunities for developing and implementing local and county mitigation activities
Multi-Hazard (5)	Deferred	Lack funding and staff availability	Develop a process for the Yamhill County Natural Hazards Mitigation Plan Steering Committee to assist in implementing, monitoring, and evaluating countywide mitigation activities.
Multi-Hazard (6)	Deferred	Lack funding and staff availability	Determine the impact that each natural hazard could have on priority transportation routes to and from emergency facilities and first responder sites.
Multi-Hazard (7)	Ongoing		Identify collaborative programs that recognize ways to decrease the risks of natural hazards.
Multi-Hazard (8)	Deferred	Lack funding and staff availability	Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration in Yamhill County.
Multi-Hazard (9)	Ongoing		Develop GIS inventories of essential facilities, at-risk buildings and infrastructure, and prioritize mitigation projects.

Table A-12. 2009 Yamhill County Mitigation Actions - Existing and Newly Considered
(Blue text items are the County's pre-identified Mitigation Action Items-2006 HMP)
Items marked with an asterisks (*) are a priority for the County.

Hazard / Priority	Status <i>(Complete, Deferred, Deleted, Ongoing)</i>	Comment	Description
Multi-Hazard (10)	Deferred	Lack funding and staff availability	Strengthen emergency services preparedness and response by linking emergency services with natural hazard mitigation programs, and enhance public education on a regional scale.
Multi-Hazard (11)	Deferred	Lack funding and staff availability	Develop, enhance, and implement education programs aimed at mitigating natural hazards and reducing the risk to citizens, public agencies, private property owners, businesses, and schools
Multi-Hazard (12)	Deferred	Lack funding and staff availability	Sustain a public awareness campaign about natural hazards.
Multi-Hazard (13)	Ongoing		Sustain an education and outreach program for local jurisdictions and assist them in developing emergency operations, public information and hazard mitigation plans.
Multi-Hazard (15)	Completed		Make the Yamhill County Emergency Operations Plan and the Natural Hazards Mitigation Plan, and other resources on hazard planning /mitigation available to the public electronically.
Multi-Hazard (16)	Ongoing		Promote hazard resistant utility construction and maintenance methods.
Multi-Hazard (17)	Deferred	Lack funding and staff availability	Develop a system for data collection for undeclared natural hazard events.
Multi-Hazard (18)	Deferred	Lack funding and staff availability	Improve coordination of and evaluate technical and engineering gaps in response service for natural hazard events. Develop a long-term recovery plan for Yamhill County from the effects of natural hazards.
Multi-Hazard (19)	New Consider	We do not currently have the time or resources to complete this in a timely manner.	Identify potential County funding sources such as: general fund, transportation fund, etc. for all ongoing mitigation actions.
Flood			
Flood (ST1)	Deferred	Lack funding and staff availability	Develop better flood warning systems
Flood (ST2)	Completed		Maintain an inventory of all permitted dams built for flood control purposes in the county.

Table A-12. 2009 Yamhill County Mitigation Actions - Existing and Newly Considered
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Hazard / Priority	Status (Complete, Deferred, Deleted, Ongoing)	Comment	Description
Flood (ST3)	Completed	<i>Yamhill County has exceeded requirements and has become CRS certified</i>	Implement the steps needed for Yamhill County to become a participant in the NFIP's Community Rating System
Flood (LT1)	Completed 2005		Update and improve the FIRM maps for Yamhill County as funding becomes available.
Flood (LT2)	Deferred	Lack funding and staff availability	Enhance data and mapping for floodplain information in the county, and identify and map flood prone areas outside of designated floodplains.
Flood (LT3)	Deferred	Lack funding and staff availability	Seek funding to train elected officials and recorders in small towns who have no emergency management background.
Flood (LT4)	Deferred	Lack funding and staff availability	Provide flood event education and outreach to households and businesses.
Flood (LT5)	Deferred	Lack funding and staff availability	Seek funding to retrofit culverts in Yamhill County with pipes designed for 50 to 100-year flood intervals.
Flood (LT6)	Deferred	Lack funding and staff availability	Coordinate with Yamhill SWCD, DOGAMI and NOAA to identify funding sources for further study of the gravel accumulations in the Willamette River at Lambert Bend.
Flood (LT7)	Ongoing		Mitigate repetitive flood loss properties.
Winter Storms			
Winter Storms *	<i>New</i>		Update or develop, implement, and maintain jurisdictional debris management plans.
Winter Storms (LT2)*	Ongoing		Enhance weather monitoring to attain earlier severe winter storm warnings.
Winter Storms (ST1)	Ongoing		Develop and implement or enhance strategies for debris management due to severe winter storms.
Winter Storms (ST2)	Deferred	Lack funding and staff availability	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
Winter Storms (ST3)	Deferred	Lack funding and staff availability	Seek funding to acquire necessary emergency back-up power systems for all RFPD facilities and other identified critical facilities.
Winter Storms (LT1)	Deferred	Lack funding and staff availability	Increase and maintain public awareness of severe winter storms and the benefits of mitigation activities through education aimed at households and businesses and increase targeting of special needs populations.

Table A-12. 2009 Yamhill County Mitigation Actions - Existing and Newly Considered
(Blue text items are the County's pre-identified Mitigation Action Items-2006 HMP)
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Hazard / Priority	Status <i>(Complete, Deferred, Deleted, Ongoing)</i>	Comment	Description
Winter Storms (LT3)	Deferred	Lack funding and staff availability	Develop and implement programs to keep trees from threatening lives, property, and public infrastructure as a result of severe weather events.
Winter Storms (LT4)	Deferred	Lack funding and staff availability	Develop and maintain comprehensive impact database and, when possible, map and publicize historical severe weather events in Yamhill County.
Winter Storms (LT5)	Deferred	Lack funding and staff availability	Support/encourage electrical utilities through public incentives/ partnerships to use underground construction methods where possible to reduce power outages from severe winter storms.
Winter Storms (LT6)	Ongoing		Promote the benefits of tree-trimming and tree replacement programs and help coordinate local efforts by public and private agencies.
Winter Storms (LT7)	Deferred	Lack funding and staff availability	Encourage harvesting of trees along utility and road corridors, preventing potential winter storm damage.
Winter Storms (LT8)	Deferred	Lack funding and staff availability	Encourage right-of-way coordination, education and management between property owners, utility operators, and government agencies.
Winter Storms (LT9)	Ongoing		Encourage harvesting of trees that are blown down during a winter storm.
Landslide			
Landslide (ST1)	Deferred	Lack funding and staff availability	Improve knowledge of landslide hazard areas and understanding of vulnerability and risk to life and property in hazard-prone areas.
Landslide (ST2)	Deferred	Lack funding and staff availability	Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.
Landslide (ST3)	Deferred	Lack funding and staff availability	Identify safe evacuation routes in high-risk debris flow and landslide areas.
Landslide (ST4)	Ongoing		Compile relative landslide risk maps for Yamhill County.
Landslide (ST5)	Deferred	Lack funding and staff availability	Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.
Landslide (LT1)	Deferred	Lack funding and staff availability	Evaluate current landslide warning systems to ensure effectiveness and efficiency and increase coordination between local jurisdictions and ODF for landslide warning systems.
Landslide (LT2)	Deferred	Lack funding and staff availability	Mitigate activities in identified potential and historical landslide areas through public outreach.

Table A-12. 2009 Yamhill County Mitigation Actions - Existing and Newly Considered
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Hazard / Priority	Status <i>(Complete, Deferred, Deleted, Ongoing)</i>	Comment	Description
Landslide (LT3)	Deferred	Lack funding and staff availability	Increase coordination between local jurisdictions, emergency responders, homeowners and ODF for landslide warning systems.
Landslide (LT4)	Deferred	Lack funding and staff availability	Investigate the development and implementation of a county landslide ordinance.
Landslide (LT5)	Deferred	Lack funding and staff availability	Protect existing development in landslide-prone areas.
Landslide (LT6)	Deferred	Lack funding and staff availability	Maintain public and private drainage systems
Wildland Fires			
Wildland Fire (LT5)*	Ongoing		Maintain and further develop interagency and private industry relationships for continuing strong fire response in Yamhill County.
Wildland Fire (ST1)	Deferred	Lack funding and staff availability	Work with the Yamhill Fire Defense Board in the review of plans and inspection of structures, access and water supply for fire code compliance.
Wildland Fire (ST2)	Deleted	Not the County's area of responsibility	Develop a Community Wildfire Protection Plan for susceptible urban/wildland interface areas in Yamhill County.
Wildland Fire (ST3)	Ongoing		Advocate water storage facilities with fire resistant electrical pump systems in developments not connected to a community water/hydrant system.
Wildland Fire (ST4)	Deferred	Lack funding and staff availability	Continue to promote public awareness campaigns for individual property owners living in the wildland/urban interface (WUI).
Wildland Fire (ST5)	Deferred	Lack funding and staff availability	Seek funding and labor opportunities to staff fuel-reduction projects throughout wildfire hazard-prone areas in Yamhill County.
Wildland Fire (ST6)	Deferred	Lack funding and staff availability	Create incentives and assist landowners in reducing fuel loads on private property.
Wildland Fire (ST7)	Deferred	Lack funding and staff availability	Increase communication, coordination and collaboration between wildland/urban interface property owners, city and county planners, and fire prevention crews and officials to address inherent risks in wildland/urban interface areas, existing mitigation (prevention/protection) measures, and federal mitigation assistance programs.
Wildland Fire (ST8)	Deferred	Lack funding and staff availability	Seek improved information gathering and distribution and technology for enhancing fire identification, initial response and evacuation if necessary.

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Hazard / Priority	Status <i>(Complete, Deferred, Deleted, Ongoing)</i>	Comment	Description
Wildland Fire (ST9)	Deferred	Lack funding and staff availability	Enhance emergency services to increase the efficiency of wildfire response and recovery activities.
Wildland Fire (ST10)	Deferred	Lack funding and staff availability	Educate agency personnel on federal cost-share and grant programs, fire protection agreements, and other related federal programs so the full array of assistance available to local agencies is understood.
Wildland Fire (ST11)	Deferred	Lack funding and staff availability	Identify funding for and develop an inventory of alternative firefighting water sources and encourage the development of additional sources.
Wildland Fire (ST12)	Deferred	Lack funding and staff availability	Identify funding for and develop an inventory of firefighting hardware to be better prepared when attacking wildfires.
Wildland Fire (ST13)	Ongoing	Fire District's AOR	Identify funding for and develop wildland fire training for fire districts near and/or within WUI communities.
Wildland Fire (LT1)	Ongoing		Promote the expansion of rural fire districts.
Wildland Fire (LT2)	Ongoing	Fire District's AOR	Look for solutions to protect structures located outside of fire districts through partnerships, grant funding or expansion of fire district services.
Wildland Fire (LT3)	Ongoing	Fire District's AOR	Reduce wildfire fuels.
Wildland Fire (LT4)	Ongoing		Promote and continue support of agricultural uses that reduce fuel loads in WUI areas.
Wildland Fire (LT6)	Ongoing	<i>Not able to accomplish but plan to implement</i>	Seek funding to develop and implement or enhance existing outreach and education programs aimed at mitigating wildfire hazards and reducing or preventing the exposure of citizens, public agencies, private property owners, and businesses to natural hazards.
Wildland Fire (LT7)	Ongoing	<i>Not able to accomplish but plan to implement</i>	Encourage development and dissemination of maps relating to fire hazards to help educate and assist builders and homeowners in being engaged in wildfire mitigation activities, and to help guide emergency services during response.
Wildland Fire (LT8)	Ongoing		Encourage implementation of wildfire mitigation activities consistent with the goals of promoting sustainable ecological management and community stability.
Earthquake			
Earthquake (LT4) *	Ongoing		Encourage earthquake safety promotion and drills to community groups
Earthquake (ST1)	Ongoing		Integrate new earthquake hazard mapping data for Yamhill County and improve technical analysis of earthquake hazards.
Earthquake (ST2)	Deferred	Lack funding and staff availability	Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.

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Hazard / Priority	Status (Complete, Deferred, Deleted, Ongoing)	Comment	Description
Earthquake (ST3)	Deferred	Lack funding and staff availability	Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.
Earthquake (ST4)	Ongoing		Maintain an inventory of all permitted dams in Yamhill County
Earthquake (ST5)	Deferred	Lack funding and staff availability	Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.
Earthquake (LT1)	Ongoing		Promote and continue building code standards.
Earthquake (LT2)	Deferred	Lack funding and staff availability	Encourage seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.
Earthquake (LT3)	Deleted	Not the County's area of responsibility (AOR)	Identify and enhance water, sewer, electric, gas and other utilities to improve their survivability in an earthquake.
Earthquake (LT5)	Deferred	Lack funding and staff availability	Improve local capabilities to perform earthquake building safety evaluations.
Earthquake	<i>New</i>		Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Wind			
Wind (LT10) *	Ongoing		Increase and maintain public awareness of severe windstorms and the benefits of mitigation activities through education aimed at households and businesses.
Wind (ST1)	Deferred	Lack funding and staff availability	Develop and implement programs to keep trees from threatening lives, property and public infrastructure during windstorm events.
Wind (ST2)	Ongoing		Develop and implement or enhance strategies for debris management and/or removal after windstorm events.
Wind (ST3)	Ongoing		Maintain tree trimming for aboveground power lines.
Wind (LT1)	Deferred	Lack funding and staff availability	Map and publicize locations around Yamhill County with the highest incidence of extreme windstorms.
Wind (LT2)	Deferred	Lack funding and staff availability	Support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from windstorms.
Wind (LT3)	Deferred	Lack funding and staff availability	Increase public awareness of windstorm mitigation activities.

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Hazard / Priority	Status (Complete, Deferred, Deleted, Ongoing)	Comment	Description
Wind (LT4)	Deferred	Lack funding and staff availability	Support/encourage contractors, homeowners and electrical utilities to use windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.
Wind (LT5)	Deferred	Lack funding and staff availability	Develop and implement programs to keep trees from threatening lives, property and public infrastructure during windstorm events.
Wind (LT6)	Deferred	Lack funding and staff availability	Identify trees that are potentially susceptible to wind throw.
Wind (LT7)	Ongoing		Encourage critical facilities to secure emergency power.
Wind (LT8)	Deferred	Lack funding and staff availability	Encourage harvesting of trees along utility and road corridors, preventing potential windstorm damage.
Wind (LT9)	Ongoing		Encourage harvesting of trees that are blown down during a windstorm.
Drought			
Drought *	<i>New</i>		Encourage coordination among municipalities for water issues.
Drought (ST1)	Ongoing		Support the technical services provided by county-based agencies on effective methods of water use curtailment.
Drought (ST2)	Deferred	Lack funding and staff availability	Encourage local governments to Inter-tie water systems.
Drought (LT1)	Ongoing		Support local agencies' training on water conservation measures to farmers and ranchers, including drought management practices for crops and livestock.
Drought (LT2)	Deferred	Lack funding and staff availability	Support the technical service and low interest loans provided to farmers and ranchers so that they can develop livestock watering systems.
Drought (LT3)	Deferred	Lack funding and staff availability	Encourage storage of water, especially off stream storage.
Drought (LT4)	Deferred	Lack funding and staff availability	Support agencies' determination of locations for additional aquifer studies that might lead to greater water supplies and help determine funding sources for the studies.
Newly Identified Natural Hazards:			
Volcano			
Volcano	<i>New</i>	Considered	Update public emergency notification procedures and develop an outreach program for ash fall events.

Table A-12. 2009 Yamhill County Mitigation Actions - Existing and Newly Considered
(Blue text items are the County's pre-identified Mitigation Action Items-2006 HMP)
Items marked with an asterisks (*) are a priority for the County.

Hazard / Priority	Status (Complete, Deferred, Deleted, Ongoing)	Comment	Description
Erosion			
Erosion	New	Considered	Develop and provide information to citizens on riverbank erosion and methods to prevent it in an easily distributed format.
Expansive Soils			
Expansive Soils	New	Considered	Require building design, engineering, and construction processes that address expansive soil conditions at potentially affected building sites.
Newly Identified Technological and Manmade Hazards:			
Dam Failure			
Dam Failure	New	Considered	Prepare high-resolution dam failure inundation area maps; use to update emergency response plans, evacuation route identification, public notification and evacuation procedures.
Disruption of Utility and Transportation Systems (DU&TS)			
DU&TS *	New	Considered	Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.
Hazardous Materials			
HAZMAT	New	Considered	Develop outreach program to educate the public regarding chemical hazards, safe handling, storage, and disposal procedures.
Terrorism			
Terrorism	New	Considered	Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.
Infectious Disease Epidemic			
Infectious Disease Epidemic *	New	Considered	Determine public health authorities and responsibilities during disaster and emergency situations, e.g. quarantine, shelter hygiene, public sanitation, and immunization.
Infectious Disease Epidemic	New	Considered	Develop a public health emergency response operations plan that includes, but is not limited to, identification and an inventory of sites with the capacity to treat large numbers of infected individuals and identification of a quarantine facility.
Infectious Disease Epidemic	New	Considered	Research and obtain necessary specialized training for public health officials to respond to an infectious disease epidemic.
Infectious Disease Epidemic	New	Considered	Establish a detection and information dissemination system for infectious disease epidemic.

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The requirements for the evaluation and implementation of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met on September 2, 2008 to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the jurisdiction-specific Mitigation Action Plan. The committee then met to determine the responsible agency and potential funding sources. This Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

MITIGATION ACTIONS PRIORITIZED & ASSIGNED

The Steering Committee reviewed the simplified social, technical, administrative, political, legal, economic, and environmental (STAPLEE) evaluation criteria (Table A-X) and the Benefit-Cost Analysis Fact Sheet (Appendix P) to consider the opportunities and constraints of implementing each particular mitigation action. The Steering Committees decided to assign a number to each STAPLEE category and subsequently added the applicable evaluation category number within the appropriate mitigation action's "hazard type".

Table A-13. Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider..."	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts

Table A-13. Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion “It is important to consider...”	Considerations
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, State, and Federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, State, and Federal laws

Upon review, the Steering Committees assigned a high priority ranking to actions that best fulfill the goals of the MHMP and are appropriate and feasible for each jurisdiction and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined that only the existing and new mitigation actions that received a high priority ranking would be included in the Mitigation Action Plan. The mitigation actions are grouped by hazard and in descending priority order within each hazard.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions
Identification of Multi-Jurisdictional Mitigation Actions Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan. Element <ul style="list-style-type: none"> ■ Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? ■ Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? Source: FEMA, July 2008.

Table A-14 displays the Yamhill County Mitigation Action Plan matrix that lists mitigation actions by hazard and are only prioritized within each hazard, not in total. Each mitigation action will be implemented and administered by the applicable managing department, agency, or responsible entity.

***Whenever TBD is used, it means that a benefit/cost analysis will be completed as a project is developed to validate the most appropriate mitigation action.*

Table A-14. Yamhill County's Mitigation Action Plan Matrix (Blue text items are the County's 2006 pre-identified Mitigation Action Items) <i>(Items marked with an asterisks (*) are a priority for the County.)</i>						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Natural Hazards						
<i>Multi-Hazard (MH)</i>						
Multi-Hazard (14) *Evaluation Category - 2	Review and update the Yamhill County Emergency Operations Plan and the Natural Hazards Mitigation Plan on an annual basis. Conduct a complete review of the plans and have then officially promulgated by the BOC every five years.	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	
Multi-Hazard *Evaluation Category - 3, 4, 6	Develop, produce, and distribute information materials concerning mitigation, preparedness and safety procedures for all natural hazards.	Emergency Management	Ongoing	General Fund, HMGP, FMA	BC: TBD TF: Yes	
Multi-Hazard (1)	Provide assistance to incorporated communities and special districts in development of Natural Hazards Mitigation Plans.	Emergency Management	Ongoing	General Fund, HMGP, PDM, FMA	BC: TBD TF: Yes	
Multi-Hazard (2)	Consider the goals and action items from the Yamhill County Natural Hazard Mitigation Plan for implementation in other county documents and programs, where appropriate.	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	
Multi-Hazard (7)	Identify collaborative programs that recognize ways to decrease the risks of natural hazards.	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	

Table A-14. Yamhill County's Mitigation Action Plan Matrix
(Blue text items are the County's 2006 pre-identified Mitigation Action Items)
(Items marked with an asterisks () are a priority for the County.)*

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Multi-Hazard (9)	Develop GIS inventories of essential facilities, at-risk buildings and infrastructure, and prioritize mitigation projects.	County and cities' emergency management, GIS	Ongoing	General Fund	BC: TBD TF: Yes	
Multi-Hazard (13)	Sustain an education and outreach program for local jurisdictions and assist them in developing emergency operations, public information and hazard mitigation plans.	Emergency Management	1-5 years, ongoing	General Fund	BC: TBD TF: Yes	
Multi-Hazard (16)	Promote hazard resistant utility construction and maintenance methods.	MWVCOG, Utility Companies	3-5 years	General Fund, Utility Company	BC: TBD TF: Yes	
MH	Review and gather Critical infrastructure address and structure value data to enable the County to develop a more effective vulnerability and risk assessment for the 2013 MHMP update.	Emergency Management	1-5 years	General Fund	BC: TBD TF: Yes	Completing this data gathering will enable the county to better define infrastructure risk and vulnerability.
Flood						
Flood (LT7)	Mitigate repetitive flood loss properties.	Cities in Yamhill County, Yamhill County	Ongoing	General Fund, FMA, HMGP, PDM	BC: TBD TF: Yes	
Winter Storm						
Winter Storms *	Update or develop, implement, and maintain jurisdictional debris management plans.	Emergency Management	1-3 years, ongoing	General Fund, EMPG,	BC: TBD TF: Yes	

Table A-14. Yamhill County's Mitigation Action Plan Matrix
(Blue text items are the County's 2006 pre-identified Mitigation Action Items)
(Items marked with an asterisks () are a priority for the County.)*

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Winter Storms (LT2) *Evaluation Category - 6, 7	Enhance weather monitoring to attain earlier severe winter storm warnings.	Emergency Management	Ongoing	General Fund, NOAA/NWS	BC: TBD TF: Yes	
Winter Storms (ST1)	Develop and implement or enhance strategies for debris management due to severe winter storms.	Road Division of Public Works, Emergency Management	1-3 years	General Fund, EMPG	BC: TBD TF: Yes	
Winter Storms (LT6)	Promote the benefits of tree-trimming and tree replacement programs and help coordinate local efforts by public and private agencies.	Public Works (Road Division)	3-5 years	General Fund, HMGP, PDM, Fire Mitigation	BC: TBD TF: Yes	
Winter Storms (LT9)	Encourage harvesting of trees that are blown down during a winter storm.	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	
Winter Storms *Evaluation Category - 6, 7	Update or develop, implement, and maintain jurisdictional debris management plans.	Emergency Management	1-3 years, ongoing	General Fund, EMPG	BC: TBD TF: Yes	
Landslide						
Landslide (ST4)	Compile relative landslide risk maps for Yamhill County.	GIS Department	Ongoing	General Fund	BC: TBD TF: Yes	Depending on DOGAMI funding in this biennium
Wildland Fire						
Wildland Fire (LT5) *Evaluation Category - 1, 4	Maintain and further develop interagency and private industry relationships for continuing strong fire response in Yamhill County.	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	

Table A-14. Yamhill County's Mitigation Action Plan Matrix
(Blue text items are the County's 2006 pre-identified Mitigation Action Items)
(Items marked with an asterisks () are a priority for the County.)*

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Wildland Fire (ST3)	Advocate water storage facilities with fire resistant electrical pump systems in developments not connected to a community water/hydrant system.	Yamhill Fire Defense Board, State Fire Marshal	Ongoing	General & Fire Mitigation Fund	BC: TBD TF: Yes	
Wildland Fire (LT1)	Promote the expansion of rural fire districts.	Yamhill Fire Defense Board, County Assessor	Ongoing	General & FMAP Funds	BC: TBD TF: Yes	
Wildland Fire (LT4)	Promote and continue support of agricultural uses that reduce fuel loads in WUI areas.	Yamhill SWCD	Ongoing	General & FMAP Funds	BC: TBD TF: Yes	
Wildland Fire (LT6)	Seek funding to develop and implement or enhance existing outreach and education programs aimed at mitigating wildfire hazards and reducing or preventing the exposure of citizens, public agencies, private property owners, and businesses to natural hazards.	Emergency Management	Ongoing	General & FMAP Funds	BC: TBD TF: Yes	Not able to accomplish but plan to implement
Wildland Fire (LT7)	Encourage development and dissemination of maps relating to fire hazards to help educate and assist builders and homeowners in being engaged in wildfire mitigation activities, and to help guide emergency services during response.	Emergency Management	Ongoing	General & FMAP Funds	BC: TBD TF: Yes	Not able to accomplish but plan to implement
Wildland Fire (LT8)	Encourage implementation of wildfire mitigation activities consistent with the goals of promoting sustainable ecological management and community stability.	Emergency Management	Ongoing	General & FMAP Funds	BC: TBD TF: Yes	

Table A-14. Yamhill County's Mitigation Action Plan Matrix
(Blue text items are the County's 2006 pre-identified Mitigation Action Items)
(Items marked with an asterisks () are a priority for the County.)*

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Earthquake (EQ)						
Earthquake (LT4) *Evaluation Category - 1, 3, 4	Encourage earthquake safety promotion and drills to community groups	Emergency Management	Ongoing	General Fund, School	BC: TBD TF: Yes	
Earthquake (ST1)	Integrate new earthquake hazard mapping data for Yamhill County and improve technical analysis of earthquake hazards.	GIS	Ongoing	General Fund, USGS	BC: TBD TF: Yes	
Earthquake (ST4)	Maintain an inventory of all permitted dams in Yamhill County	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	
Earthquake (LT1)	Promote and continue building code standards.	Building Department	Ongoing	General Fund	BC: TBD TF: Yes	
Earthquake	Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.	Emergency Management	1-3 years	General Fund, HMGP	BC: TBD TF: Yes	
Wind						
Wind (LT10) *Evaluation Category - 1, 3, 4	Increase and maintain public awareness of severe windstorms and the benefits of mitigation activities through education aimed at households and businesses.	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	
Wind (ST2)	Develop and implement or enhance strategies for debris management and/or removal after windstorm events.	Emergency Management, Public Works	Ongoing	General Fund	BC: TBD TF: Yes	
Wind (ST3)	Maintain tree trimming for aboveground power lines.	Public Works	Ongoing	General Fund, HMGP, HMA, FMAP	BC: TBD TF: Yes	

Table A-14. Yamhill County's Mitigation Action Plan Matrix
(Blue text items are the County's 2006 pre-identified Mitigation Action Items)
(Items marked with an asterisks () are a priority for the County.)*

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Wind (LT7)	Encourage critical facilities to secure emergency power.	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	
Wind (LT9)	Encourage harvesting of trees that are blown down during a windstorm.	Emergency Management	Ongoing	General Fund	BC: TBD TF: Yes	
Drought						
Drought *Evaluation Category - 1, 3, 4	Encourage coordination among municipalities for water issues.	Yamhill County	1-2 years	General Fund	BC: TBD TF: Yes	
Drought (ST1)	Support the technical services provided by county-based agencies on effective methods of water use curtailment.	Yamhill SWCD, Yamhill Basin Council, OSU Extension Service	Ongoing	General Fund	BC: TBD TF: Yes	
Drought (LT1)	Support local agencies' training on water conservation measures to farmers and ranchers, including drought management practices for crops and livestock.	Yamhill SWCD	Ongoing	General Fund	BC: TBD TF: Yes	
Newly Identified Natural Hazards:						
Volcano						
Volcano	Update public emergency notification procedures and develop an outreach program for ash fall events.	Emergency Management/ Fire Dept	1-3 years	General Fund, NOAA/NWS	BC: TBD TF: Yes	
Erosion						
Erosion	Develop and provide information to citizens on riverbank erosion and methods to prevent it in an easily distributed format.	Emergency Management	1-3 years	General Fund, HMGP, HMA	BC: TBD TF: Yes	

Table A-14. Yamhill County's Mitigation Action Plan Matrix
(Blue text items are the County's 2006 pre-identified Mitigation Action Items)
(Items marked with an asterisks () are a priority for the County.)*

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Expansive Soils						
Expansive Soils	Require building design, engineering, and construction processes that address expansive soil conditions at potentially affected building sites.	Planning	0-1 years	General Fund	BC: TBD TF: Yes	
Newly Identified Technological and Manmade Hazards:						
Dam Failure						
Dam Failure	Prepare high-resolution dam failure inundation area maps; use to update emergency response plans, evacuation route identification, public notification and evacuation procedures.	Emergency Management, GIS	0-1 years	General Fund, USACOE, County GIS	BC: TBD TF: Yes	
Disruption of Utilities and Transportation Systems (DUTS)						
DU&TS *Evaluation Category - 1, 3, 4	Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.	Emergency Management	1-3 year	General Fund, HMGP, HSGP	BC: TBD TF: Yes	
Hazardous Materials (HAZMAT)						
HAZMAT	Develop outreach program to educate the public regarding chemical hazards, safe handling, storage, and disposal procedures.	Emergency Management	1-3 years	General Fund, HSGP	BC: TBD TF: Yes	
Terrorism Mitigation						
Terrorism	Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.	Emergency Management	0-1 years	General Fund, HSGP	BC: TBD TF: Yes	

Table A-14. Yamhill County's Mitigation Action Plan Matrix
(Blue text items are the County's 2006 pre-identified Mitigation Action Items)
(Items marked with an asterisks () are a priority for the County.)*

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
<i>Infectious Disease Epidemic(IDE)</i>						
IDE *Evaluation Category - 3, 4	Determine public health authorities and responsibilities during disaster and emergency situations, e.g. quarantine, shelter hygiene, public sanitation, and immunization.	Emergency Management, Public Health	1-2 years	General Fund, HSGP, HSS	BC: TBD TF: Yes	
IDE	Develop a public health emergency response operations plan that includes, but is not limited to, identification and an inventory of sites with the capacity to treat large numbers of infected individuals and identification of a quarantine facility.	Public Health, Emergency Management	1-3 years	General Fund, HSGP, HSS	BC: TBD TF: Yes	
IDE	Research and obtain necessary specialized training for public health officials to respond to an infectious disease epidemic.	Public Health	Ongoing	General Fund, HSGP, HSS	BC: TBD TF: Yes	
IDE	Establish a detection and information dissemination system for infectious disease epidemic.	Public Health	Ongoing	General Fund, HSGP, HSS	BC: TBD TF: Yes	

Appendix B

City of Amity

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This appendix contains the specific information about the City of Amity, Oregon to support the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section further describes the City of Amity's planning process by listing Steering Committee membership, documenting public outreach efforts, and summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process. Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The City of Amity is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill the goal, the city organized a Hazard Mitigation Plan development Steering Committee dedicated to identifying hazard threats and developing actions to mitigate damage and life losses from those threats.

Table B-1 contains the City of Amity's Steering Committee participant list to augment the Yamhill County planning elements.

Table B-1. City of Amity Steering Committee	
Name	Agency/Department/Affiliation
Jennifer Elkins	City Recorder
Matt Johnson	Public Works Lead Operator
Michael Cape	Mayor
Charles Eaton	Consulting Engineer with CSACE
Bruce Hubbard	Fire Chief

Table B-2 contains the summary of the city's public involvement and planning meeting activities.

Table B-2. City of Amity Public Involvement Mechanisms	
Mechanism	Description
Newsletter Distribution	Posted at City Hall, Post Office, Library, Council Chambers
Public Meetings	Held August 15 and 18, 2008

CAPABILITY ASSESSMENT

Table B-3, B-4, and B-5 contain the City's resources used to support planning activities, including the reports and studies reviewed as part of the update process.

Table B-3. City of Amity Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Amity Comprehensive Plan (1992/2003)	Guides community governance, delineates authority and responsibility, and defines development process.
	Water Master Plan	Highlights necessary improvements in the water system.
	Wastewater Master Plan	Highlights necessary improvements in the wastewater system.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency.
	Title 8.70 Hazardous Materials Releases	Provides procedure for coordination among various agencies in the event of hazardous material releases.
	City of Amity Development Code 2000	Defines development criteria and building regulations.
	Floodplain Ordinances	Delineates development, building codes, and land-use regulations.

Table B-4. City of Amity Administrative and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Contract-Jim Minard
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Contract-Mark Burrows, Burrows Consulting Services Inc
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Contract Engineer-CSA Engineering
Floodplain manager	City Administrator
Personnel skilled in GIS and/or HAZUS-MH	None
Director of Emergency Services	None
Finance (grant writers, purchasing)	City Administrator
Public Information Officers	City Recorder/City Administrator/Mayor

Table B-5. City of Amity Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	Yes
Authority to levy taxes for specific purposes	Yes, with a vote of the people
Incur debt through general obligation bonds	Yes, with a vote of the people
Incur debt through special tax and revenue bonds	Yes
Incur debt through private activity bonds	Unsure
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding is available on an annual basis. This grant can be used to mitigate and protect repetitively flooded structures and infrastructure.
United State Fire Administration (USFA) Grants	Grants are available to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards	
Identifying Hazards	
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.	
Element	
■ Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	
Source: FEMA, July 2008.	

The City of Amity's Steering Committee determined the following hazards (identified with an X) could potentially threaten the community. Those hazards identified with an (*) are newly identified by the county as part of the update process.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	
Wind	X
Erosion*	
ENSO (El Niño / La Niña)*	X
Expansive Soils*	
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	X
Infectious Disease Epidemic*	

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for the City of Amity to augment the MHMP development process. It consists of:

- Identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment]must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

The City of Amity actively participates in FEMA's NFIP and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City of Amity’s Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction’s risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets within each community that may be affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the City’s existing building and infrastructure assets and insured values, and are identified in detail in Tables B-6A, B-6B, and B-7.

Tables B-8, B-9, and B-10 portray the City’s critical infrastructure numbers and values, and their potential vulnerability by hazard type.

The City of Amity seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table B-6A were obtained from the 2000 U.S. Census and Portland State University. It comprises census block level data, and estimates from university conducted community research.

The City’s existing building and infrastructure and insured values are identified in Tables B-6A, B-6B, and B-7.

Table B-6A. City of Amity Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census ³	Total Building Count	Total Value of Buildings (\$) ¹
1,478	1,480	1,480	495	\$55,899,693 ²

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$112,700 per structure).

² Yamhill county Taxing Districts: http://www.co.yamhill.or.us/assessor/Documents/2007_Taxing_Districts.pdf

³ Portland State University (PSU) 2007 Oregon Population Report.

Table B-6B. City of Amity NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties ¹
Amity	759	0	2	197,800	379.5	0	0	0

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

¹Content and building claims.

(Note – many critical facilities and locations have been identified and included in this inventory and risk assessment – due to their confidential nature, their locations have been “shaded” for publication. The data will remain in the report for the County’s future mitigation planning efforts)

Table B-7. City of Amity Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Government	City Hall/ Court/ Amity Police and Fire Station #1	401 S. Trade or 109 Maddox Ave. (same location)	\$1,310,923.43
	City of Amity	20000 Briedwell Rd	\$40,385
	Other Amity Assets		\$1,173,905
Government	Amity Public Works Department	401 E. 3rd St.	\$812,888
	Amity US Post Office	102 Woodson St.	\$500,000
Emergency Response	Amity Police and Fire Station #1	Inside City Hall Bldg	See Government Section
Educational	Amity Preschool and Elementary School (K-5)	300 Rice Lane	\$9,107,827
	Amity Middle School (6-8)	115 Church St.	\$8,646,335
	Amity High School (9-12)	503 Oak St.	\$10,972,362
	Other School Assets		\$2,044,548
Community	Amity Cemetery	See map	
	Amity City Library	307 N. Trade St.	\$443,838
	Amity City Park	See map	Unknown
	Amity Assembly of God	310 Getchell St.	\$181,490
	Amity First Baptist Church	205 6th St.	Unknown
	Amity & McCabe United Methodist Churches	203 SE Nursery Ave	\$61,576
	Brigittine Monastery	23300 SW Walker Lane	Unknown
	Church of Christ	1305 Goucher St.	\$1,051,599
	Church of Jesus Christ of Latter Day Saints	18565 S Hwy 99 W	Unknown
	Assembly of God Church	708 S. Jellison St.	\$98,774
State and Federal Highways	Hwy 99W N/S 2 lane no sidewalk		Unknown
	Bellevue Hwy-2 lane no sidewalks		Unknown
	Amity Hopewell Hwy-2 lane with sidewalks		Unknown
Railroads	Willamette & Pacific (Freight Only) parallel Hwy 99	741 NE Third Street, McMinnville	Unknown
Bridges	Bridge on Hwy 99 just south city limits		Unknown
	Bridge on Bellevue Hwy just outside city limits		Unknown
	Bridge on Amity Hopewell Hwy at City Limits		Unknown

Table B-7. City of Amity Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Utilities	NW Natural Gas		Unknown
	Amity Water Treatment (South Yamhill River Source-built in 1969)		\$47,109
	Amity Waste Water Treatment (built in 1961)		\$1,011,957
	Amity Storm Drain System		Unknown
	City Sanitary & Recycling		Unknown
	Lift Stations (3)		Unknown
	Landfill-Riverbend Landfill		Unknown
	Telephone-Verizon		Unknown
	Cell Services-provided; no towers		Unknown
	PGE Electric		Unknown
	Comcast TV		Unknown
	AT&T Wireless		Unknown
	Cricket DMT Wireless		Unknown
	Go Wireless Inc.		Unknown

Sources: City of Amity

FEMA HAZUS-MH, local jurisdictions.

¹ Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is discussed in the Yamhill County MHMP, Section 6, which generated the following Hazard Exposure Analysis Overviews. Tables B-8, B-9, and B-10 present, in tabular form, results obtained from the GIS analysis depicted in hazard figures located in Appendix K.

Table B-8. City of Amity Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population Number	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$) ¹	Number	Value (\$) ¹
Flood	Moderate	500-year floodplain		*	*	*	*
	High	100-year floodplain		*	*	*	*
Winter Storm		descriptive	1,480	495	\$55,786,500	*	*
Wildland Fire	Moderate	Moderate fuel rank		*	*	*	*
	High	High fuel rank		*	*	*	*
	Very High	Very high fuel rank		*	*	*	*
	Extreme	Extreme fuel rank		*	*	*	*
Earthquake	Strong	9-20% (g)		*	*	*	*
	Very strong	>20-40% (g)		*	*	*	*
	Severe	>40-60% (g)		*	*	*	*
Wind		descriptive	1,480	495	\$55,786,500	*	*
El Nino and La Nina		descriptive	1,480	--	--	--	--
Drought		descriptive	1,480	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	1,480	--	--	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes		*	*	*	*
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites		*	*	*	*

Table B-8. City of Amity Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$) ¹	Number	Value (\$) ¹
Terrorism		descriptive	1,480	495	\$55,786,500	*	*

¹Estimated and/or insured structural value. Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$112,700 per structure). *Note-population and buildings by parcel or census block data was not available at the time this document was prepared. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed.

Table B-9. City of Amity Potential Hazard Exposure Analysis Overview-Critical Facilities												
			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	--	--	--	1	9.1M	--	--	2	1M
	High	100-year floodplain	--	--	--	--	1	8.6M	--	--	4	1M
Winter Storm		Descriptive	5	3.8M	1	1.3M	4	31M	--	--	10	1.9M
Wildland Fire	Moderate	Moderate fuel rank	4	2.7M	1	1.3M	3	28.7M	--	--	10	1.9M
	High	High fuel rank	1	40K	--	--	2	19.6M	--	--	6	1M
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	5	3.8M	1	1.3M	4	31M	--	--	10	1.9M
	Very strong	20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Wind		Descriptive	5	3.8M	1	1.3M	4	31M	--	--	10	1.9M
El Nino and La Nina		Descriptive	--	--	--	--	--	--	--	--	--	--
Drought		Descriptive	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		Descriptive	--	--	--	--	--	--	--	--	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	4	2.6M	1	unknown	3	28.7M	--	--	8	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	2	17.7M	--	--	4	543K
Terrorism		Descriptive	5	3.8M	1	1.3M	4	31M	--	--	10	1.9M

(1) Values may not be available for all facilities.

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Table B-10. City of Amity Potential Hazard Exposure Analysis Overview-Critical Infrastructure														
			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)¹	Miles	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	1	unknown	--	--	--	--	--	--
	High	100-year floodplain	--	--	--	--	3	unknown	--	--	2	unknown	--	--
Winter Storm		descriptive	3	unknown	1	unknown	3	unknown	--	--	14	1M	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	3	unknown	--	--	10	1M	--	--
	High	High fuel rank	--	--	--	--	2	unknown	--	--	3	47K	--	--
	Very High	Very high fuel rank	--	--	--	--	1	unknown	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	3	unknown	1	unknown	3	unknown	--	--	14	1M	--	--
	Very strong	20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Wind		descriptive	3	unknown	1	unknown	3	unknown	--	--	14	1M	--	--
El Nino and La Nina		descriptive	--	--	--	--	--	--	--	--	--	--	--	--
Drought		descriptive	--	--	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	3	unknown	1	unknown	3	unknown	--	--	14	1M	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	3	unknown	1	unknown	1	unknown	--	--	9	1.1M	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	3	unknown	--	--	1	unknown	--	--	5	unknown	--	--
Terrorism		descriptive	3	unknown	1	unknown	3	unknown	--	--	14	1M	--	--

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SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section describes each hazard and the City of Amity's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for the City of Amity. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In the City of Amity, one educational facility (worth \$8.6M), four community facilities (worth \$1M), three bridges (value unknown) and two utilities (value unknown) are within the boundaries of the 100-year floodplain.

One educational facility (worth \$9.1M), two community facilities (worth \$1M), and one bridge (value unknown) is located within the 500-year floodplain.

Winter Storm

The ice, cold temperatures, high winds and floods accompanying winter storms can cause widespread impacts. Damage to facilities and infrastructure can be severe depending on the intensity of the storm event.

Since winter storms are regional events, the entire City of Amity can be equally affected. Therefore the entire population (1,480 residents), 495 residential structures (value \$55.8M), five government facilities (value \$3.8M), one emergency response facility (value \$1.3M), four educational facilities (value \$31M), 10 community facilities (value \$1.9M), three highway and one rail segment (value unknown), three bridges (value unknown), and 14 utilities (value \$1M) are at risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Risk levels of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

The City of Amity has critical facilities and infrastructure located within areas of moderate, high and very high risk. Moderate risk areas contain four government facilities (worth \$2.7M), one emergency response facility (value unknown), three educational facilities (worth \$28.7M), ten community facilities (worth \$1.8M), three bridges (value unknown) and ten utilities (worth \$1M).

High risk areas contain one government facility (worth \$40K), two educational facilities (worth \$19.6M), six community facilities (worth \$1M), two bridges (value unknown) and three utilities (worth \$47K).

Very high risk areas contain one bridge (value unknown).

Earthquake

Based on Peak Ground Acceleration (PGA) shake maps produced by the U.S. Geologic Survey, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable slopes. In addition to landslides, earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The City of Amity is in the eastern portion of Yamhill County in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak acceleration of the ground caused by the earthquake. A strong designation corresponds to 9 to 20 percent of the acceleration of gravity.

All areas within the City of Amity are equally at risk of an earthquake and are located in the strong shaking zone (9-20% g). Therefore the entire population (1,480 residents), 495 residential structures (value \$55.8M), five government facilities (value \$3.8M), one emergency response facility (value \$1.3M), four educational facilities (value \$31M), 10 community facilities (value \$1.9M), three highway and one rail segment (value unknown, three bridges (value unknown, and 14 utilities (value \$1M) are at risk.

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Amity are equally at risk of a windstorm event. Therefore the entire population (1,480 residents), 495 residential structures (value \$55.8M), five government facilities (value \$3.8M), one emergency response facility (value \$1.3M), four educational facilities (value \$31M), 10 community facilities (value \$1.9M), three highway and one rail segment (value unknown, three bridges (value unknown, and 14 utilities (value \$1M) are at risk.

ENSO (El Niño and La Niña)

ENSO (El Niño and La Niña) events cause large scale weather pattern changes throughout Yamhill County, and across the State of Oregon. In the City of Amity, El Niño periods are generally drier with an increased likelihood of drought. La Niña periods tend to be wetter and colder with an increased risk of winter storms and associated hazards, particularly flooding and landslides.

The changes wrought by ENSO are large scale, and it is difficult to quantify their impacts locally. Instead, ENSO is manifested in the hazards it influences, such as winter storms,

flooding, landslides and drought. Therefore, the quantitative impacts have been summarized in those categories.

Drought

State-wide droughts have historically occurred in Oregon. The region-wide phenomenon presents risks equally to all residents. Structural damage from drought is not expected; rather the risks apply to humans and resources. Industries important to Amity's local economy such as agriculture, fishing, and timber have historically been affected. Future droughts would have tangible economic and potentially human impacts.

Disruption of Utility and Transportation Systems

Transportation system disruption impacts range from effects on life, health, and safety to economic effects from delays, lost commerce, and lost time. Emergency vehicle mobility and access to hospitals, evacuation routes, and vital supplies can be affected if transport is seriously disrupted for an extended period. Similarly, disruption of utility systems can affect commerce, recreation, and fundamental health and safety in Yamhill County and the City of Amity. Countywide and citywide disruptions are likely to impact all residents equally. Structural damage from disruptions to these systems is not expected; rather the risks apply equally to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the Environmental Protection Agency's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses generating hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and all facilities within a 0.25 miles radius of those are considered at risk.

In the City of Amity, four government facilities (worth \$2.6M), one emergency response facilities (value unknown), three educational facilities (worth \$28.7M), eight community facilities (worth \$786K), one bridge (values unknown), nine utilities (worth \$1.1M), three highways and one railroad (value unknown) are considered at risk.

Two educational facilities (worth \$17.7M), four community facilities (worth \$543K), one bridge (values unknown), five utilities (value unknown), three highways and one railroad (value unknown) are located within the buffered EHS sites.

Terrorism

It is difficult to determine the scope of any terrorist threat to the City of Amity. Although there seem to be few high-profile targets present, it is impossible to predict future terrorist events. Depending on the extent of the action, the community may suffer economic loss, disruption of utilities, and cleanup relating to explosions and other facility damages. All facilities and residents are equally at risk of being impacted by this threat.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County's mitigation goals listed in Table B-11, or to revise them to more fully meet the city's needs. The committee proceeded to evaluate potential mitigation actions after finalizing the mitigation goals.

Mitigation actions are activities, measures, or projects used to achieve the goals of a mitigation plan. Table B-12 depicts the city's considered mitigation actions developed during this mitigation planning process. The revised list in Table B-14 delineates those actions the city will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

The City of Amity actively participates in FEMA's NFIP and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City of Amity's Mitigation Strategy identified and analyzed potential flood mitigation actions to fulfill NFIP initiatives, specifically addressing RL properties. They subsequently selected and prioritized city appropriate actions to assure an effective flood mitigation program.

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table B-11. 2006 Yamhill County Mitigation Goals-Considered	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

Table B-12. City of Amity Mitigation Actions Considered

Hazard	Status	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
MH	<i>Ongoing</i>	In place	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable). New construction is required to anchor by code.
MH	Consider		Review ordinances and develop outreach programs to assure fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.
MH	<i>Ongoing</i>		Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	<i>Ongoing</i>	In place	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	Consider		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	Consider		Install lightening rods and lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.
MH	Consider		Retrofit structures to protect them from seismic, floods, high winds, earthquakes, or other natural hazards.
MH	Consider		Acquire, demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.
MH	Consider		Identify and pursue funding opportunities to implement mitigation actions.
MH	Consider		Integrate the Mitigation Plan findings into planning and regulatory documents and programs and into enhanced emergency planning.

Table B-12. City of Amity Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood			
Flood	Consider		Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.
Flood	Consider		Develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.
Flood	Consider		Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100- year floodplain using survey elevation data.
Flood	Consider		Implement mitigation measures identified by critical facilities' owners, and other facility owners, to protect facilities located within the 100-year floodplain.
Flood	Consider		Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current USACOE flood data.
Flood	Ongoing	In place	Develop, implement, and enforce floodplain management ordinances.
Flood	Consider		Develop outreach program to educate residents concerning flood proofed well and sewer/septic installation.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof identified properties.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof critical facilities.
Flood	Ongoing	In place	Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	Consider		Construct earthen berms to divert flood flows into bridge or culvert openings. The earth fill should be erosion-resistant and the berms should be covered with erosion-resistant fabric, armoring materials, or vegetation.
Flood	Consider		Increase culvert size to increase its drainage efficiency.
Flood	Consider		Isolate and improve existing wastewater system that currently has poor hydraulic gradient
Flood	Consider		Create high water overflow conveyance systems.
Flood	Consider		Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.
Flood	Consider		Provide flood protection to mitigate damage and contamination of wastewater treatment systems.

Table B-12. City of Amity Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	Consider		Relocate wastewater lift stations (2) outside of the 100-year floodplain
Flood	Consider		Develop and implement flood risk reduction program and outreach efforts considering upstream storage, channel improvements, and flood walls or levee construction.
Winter Storm			
Winter Storm	<i>Ongoing</i>	In place	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
Winter Storm	Consider		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	<i>Ongoing</i>	In place	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
Winter Storm	<i>Ongoing</i>		Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
Winter Storm	Consider		Purchase NOAA Weather radios and develop a web portal linking residents to various weather information sites. (NWS, FEMA, The Weather Channel).
Winter Storm	Consider		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
Winter Storm	Consider		Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests.
Winter Storm	<i>Ongoing</i>	In place	Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter Storm	Consider		Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.
Landslide			
Landslide	Consider		Complete a landslide location inventory, identify threatened critical facilities and other buildings and infrastructure.
Landslide	Consider		Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.

Table B-12. City of Amity Mitigation Actions Considered

Hazard	Status	Comment	Description
Landslide	Consider		Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).
Landslide	Consider		Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
Landslide	Consider		Develop comprehensive geological landslide and rockslide prone area maps.
Landslide	Consider		Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.
Landslide	Consider		Identify and seasonally restrict recreational and construction activities in high landslide areas.
Landslide	Consider		Develop, implement and enforce property development landslide risk assessment procedures to identify potential facility vulnerability.
Wildland Fire			
Wildland Fire	Consider		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Wildland Fire	Consider		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
Wildland Fire	Consider		Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.
Wildland Fire	Consider		Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.
Earthquake			
Earthquake	Consider		Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.
Earthquake	Consider		Retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.
Earthquake	Consider		Retrofit bridges that are not seismically adequate for lifeline transportation routes.
Earthquake	Ongoing	In place	Update existing (or adopt the most current) Uniform Building Code
Earthquake	Ongoing	In place	Implement and enforce the Uniform, International, and State Building Codes.
Earthquake	Ongoing	In place	Inspect and/or certify all new construction.
Earthquake	Consider		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.

Table B-12. City of Amity Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake	Consider		Identify and prioritize a list of critical facilities with unreinforced masonry problems including non-structural projects such as brick chimney bracing or replacement, water heater bracing, and anchoring, etc.
Earthquake	Consider		Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.
Earthquake	Consider		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Earthquake	Consider		Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.
Volcano			
Volcano	Consider		Update public emergency notification procedures and develop an outreach program for ash fall events.
Volcano	Consider		Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.
Volcano	Consider		Evaluate capability of water treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.
Volcano	Consider		Evaluate ash impact on storm water drainage system and develop mitigation actions.
Wind			
Wind	<i>Ongoing</i>	In place	Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable). All new construction is required to follow current codes.
Wind	Consider		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.
Wind	Consider		Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.
ENSO (El Niño / La Niña)			
ENSO	Consider		Educate public regarding weather patterns associated with El Niño / La Niña.
Drought	Consider		Develop educational programs and initiatives related to water conservation and irrigation during drought periods.

Table B-12. City of Amity Mitigation Actions Considered			
Hazard	Status	Comment	Description
Disruption of Utility and Transport Systems (DUTS)			
DUTS	Consider		Review and update emergency response plans for utility disruptions.
DUTS	Consider		Review and update emergency response plans for transportation route disruptions.
DUTS	Consider		Identify and prioritize all “jurisdiction owned” & “non-jurisdiction owned” critical facilities that have backup power and emergency operations plans.
DUTS	Consider		Purchase backup power systems for all identified critical facilities.
HAZMAT			
HAZMAT	Ongoing	In place	Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.
HAZMAT	Ongoing	In place	Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.
HAZMAT	Ongoing	In place	Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.
HAZMAT	Consider		Research, develop, and implement methods to protect waterways from hazardous materials events.
HAZMAT	Consider		Prepare a site-specific summary of hazardous materials used, stored, and commonly transported in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.
Terrorism			
Terrorism	Consider		Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met to review, evaluate, and prioritize each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. The Committee then coordinated activities to determine the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

The City of Amity Steering Committee evaluated the simplified STAPLEE evaluation criteria (shown below) and the Benefit-Cost Analysis Fact Sheet (Appendix P) for prioritizing its “considered” mitigation actions listed in Table B-12.

Evaluation Criteria for Mitigation Actions		
Evaluation Category	Discussion “It is important to consider...”	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, State, and Federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, State, and Federal laws

Upon review, the Steering Committee assigned a high priority ranking to actions best fulfilling the goals of the MHMP and are appropriate and feasible for the city and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined only the existing and new mitigation actions receiving a high priority ranking would be included in the Mitigation Action Plan. Table B-14 depicts the City of Amity’s mitigation actions grouped by hazard and in descending priority order within each hazard.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

The City of Amity reviewed the Yamhill County goals and determined they suit the City's needs and subsequently adopted the Goals in Table B-13 for the current planning period.

Table B-13. City of Amity Mitigation Goals	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
<ul style="list-style-type: none"> Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? 	
Source: FEMA, July 2008.	

Table B-14 displays the City of Amity’s Mitigation Action Plan matrix listing mitigation actions by hazard and are only prioritized within each hazard, not in total. Each mitigation action will be implemented and administered by the applicable managing department, agency, or responsible entity.

***Whenever TBD is used, it means that a benefit/cost analysis will be completed as a project is developed to validate the most appropriate mitigation action.*

Table B-14. City of Amity Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Natural Hazards						
<i>Multi-Hazard (MH)</i>						
MH	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.	Building	Completed annually	General Fund	BC: TBD TF: Yes	
MH	Identify and pursue funding opportunities to implement mitigation actions.	Public Works	0-5 Years	General Fund	BC: TBD TF: Yes	
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	Public Works	Completed	General Fund, HSGP, HMGP	BC: TBD TF: Yes	
MH	Install lightening rods and lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.	Public Works	Completed	General Fund, HMGP	BC: TBD TF: Yes	
MH	Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.	Public Works	0-2 years	General Fund, HMGP, HMA, FMA	BC: TBD TF: Yes	

Table B-14. City of Amity Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
<i>Flood</i>						
Flood	Relocate wastewater lift stations (2) outside of the 100-year floodplain	Public Works	4-5 years	General Fund, HMGP, HMA,	BC: TBD TF: Yes	
Flood	Isolate and improve existing wastewater system that currently has poor hydraulic gradient	Public Works	0-5 years	General Fund, HMGP, HMA,	BC: TBD TF: Yes	
Flood	Provide flood protection to mitigate damage and contamination of wastewater treatment systems.	Public Works	0-5 years	General Fund, HMGP, HMA	BC: TBD TF: Yes	
Flood	Relocate water intake facility to ensure potable water supply	Public Works	0-5 years	General Fund, HMGP, HMA	BC: TBD TF: Yes	
Flood	Create high water overflow conveyance systems.	Public Works	0-2 years	General Fund, HMGP, HMA	BC: TBD TF: Yes	
<i>Landslide</i>						
Landslide	Identify critical facilities and vulnerable populations based on mapped high hazard areas.	Planning	0-2 years	General Fund	BC: TBD TF: Yes	
<i>Wildland Fire</i>						
Wildland Fire	Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.	Public Works	0-3 years	General Fund, FMAP	BC: TBD TF: Yes	
<i>Earthquake (EQ)</i>						
EQ	Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.	Public Works	0-2 years	General Fund	BC: TBD TF: Yes	
EQ	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.	Public Works	0-5 years	General Fund, HMGP, HMA, NEHRP	BC: TBD TF: Yes	

Table B-14. City of Amity Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
EQ	Retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.	Public Works	5+ years	General Fund, HMGP, HMA, NEHRP	BC: TBD TF: Yes	
Volcano						
Volcano	Update public emergency notification procedures and develop an outreach program for ash fall events.	Police, Fire, County Emergency Management	Ongoing	General Fund, NOAA/ NWS	BC: TBD TF: Yes	
Wind						
Wind	Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.	Public Works/Utility Companies	4-5 years	General Fund, Utility Company	BC: TBD TF: Yes	
Wind	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.	Public Works/Utility Companies	5 years	General Fund, HMGP	BC: TBD TF: Yes	
ENSO (El Niño / La Niña)						
ENSO	Educate public regarding weather patterns associated with ENSO events.	Admin	5+ years	General Fund, NOAA NWS	BC: TBD TF: Yes	
Drought						
Drought	Develop educational programs and initiatives related to water conservation and irrigation during drought periods.	Public Works	0-2 years	General Fund, NRCS	BC: TBD TF: Yes	

Table B-14. City of Amity Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Manmade and Technological Hazards						
<i>Disruption of Utility and Transport Systems (DUTS)</i>						
DUTS	Identify and prioritize all “jurisdiction owned” & “non-jurisdiction owned” critical facilities that have backup power and emergency operations plans.	Public Works Department	0-2 years	General Fund	BC: TBD TF: Yes	
DUTS	Purchase backup power systems for all identified critical facilities.	Public Works Department	3-5 years	General Fund, HSGP	BC: TBD TF: Yes	
<i>Hazardous Materials (HAZMAT)</i>						
HAZMAT	Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.	Public Works Department	0-1 year	General Funds, CERCLA, EMPG, EPA, SARA., HSGP	BC: TBD TF: Yes	
HAZMAT	Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.	Public Works Department	0-1 year	General Funds, CERCLA, EMPG, EPA, SARA., HSGP	BC: TBD TF: Yes	
<i>Terrorism</i>						
Terrorism	Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.	Police Department	0-5 years	General Funds, HSGP, SHSP, IECGP, EOC, RCPGP, CTGP	BC: TBD TF: Yes	

Appendix C

City of Carlton

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This appendix contains specific information about the City of Carlton, Oregon to support the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section further describes the City of Carlton's planning process by listing Steering Committee membership, documenting public outreach efforts, and summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process. Statewide plans will not be accepted as multi-jurisdictional plans.

Element

Does the new or updated plan describe how each jurisdiction participated in the plan's development?

Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and

Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

Does the plan provide a narrative description of the process followed to prepare the new or updated plan?

Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)

Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)

Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?

Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?

Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The City of Carlton is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill goal, the city organized a MHMP development Steering Committee dedicated to identifying hazard threats and developing actions to be taken to mitigate damage and life losses from those threats.

Table C-1 contains the City of Carlton's Steering Committee participant list to augment the Yamhill County MHMP planning elements.

Table C-1. City of Carlton Steering Committee	
Name	Agency/Department/Affiliation
Steven Weaver	City Manager
Frank Butler	Police Chief
Bryan Burnham	Public Works Superintendent
Terry Lucich	Carlton Fire District Chief
Roy Durfee	Facilities Manager for Yamhill Carlton School District

Table C-2 contains the summary of the City of Carlton's public involvement and planning meeting activities.

Table C-2. City of Carlton Public Involvement Mechanisms	
Mechanism	Description
Newsletter distribution	Newsletters were distributed through utility bills as well as posted on the city website to request public input and present the project to the public (April and August 2008).
Website	www.ci.carlton.or.us
Community Press	Newsletters published by school district that goes out every 6 weeks.
Community Meetings	Planning Commission, City Council, Other Committee meetings such as Water Committee and Parks Committee.
City's Water Bills	Bills go out every month and able to write a few lines on the bill itself or include inserts.
Community Board located next to the Depot	Community Events are listed on the board and changed when needed.
News Register	Newspaper located in McMinnville that serves Yamhill County.
Posting on City Hall door and Post Office	City posts all meetings both at the post office and city hall.
Public Meetings	Draft risk assessment public meetings held August 15 and 18, 2008 to request public input.

CAPABILITY ASSESSMENT

Table C-3, C-4, and C-5 contain the City of Carlton's resources used to support planning activities, including the reports and studies reviewed as part of the update process.

Table C-3. City of Carlton Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Comprehensive Plan	Used to guide long term city growth and development and to comply with state and federal laws.
	Water System Emergency Response Plan 2004	Defines water system threats
	Water Vulnerability Assessment 2002	Informs City of vulnerabilities
	Wastewater Vulnerability Assessment 2007	Informs City of vulnerabilities
	BLM Landslide Study Carlton Reservoir/ Panther Creek 1999 & Water Quality Evaluation	This was in response to a landslide in the city's watershed on BLM property. Half of the reservoir was filled resulting in turbidity problems for water treatment.
	FEMA Flood Maps	Delineates the floodplain, floodway, and restricted building areas.
	Watershed Councils North Yamhill Assessment	Provides historical data concerning urbanization, vegetation, flood, creek flow, and other relevant information to enable effective mitigation planning
	Water Master Plan	Examines city water system and determines the projects needed in the next 20 years
	Sewer Master Plan	Examines city sewer system and determines the projects needed in the next 20 years
	Stormwater Master Plan	Examines city storm water system and determines the projects needed in the next 20 years.
	Park Master Plan	Examines city parks and determines the need for more parks or improvements to existing parks.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency. Describes known hazards

Table C-3. City of Carlton Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Effect on Hazard Mitigation
	Title 8.70 Hazardous Materials Releases	Provides procedure for coordination among various agencies in the event of hazardous materials releases. Describes known hazards
	Development Code 2.111Flood Plain Management	Floodplain Management and land-use
	Development Code	Land use and development
	Public Works Design Standards	Delineates design criteria for storm water drainage, and other public works projects to ensure mitigation potential damages from over capacity.

Table C-4. City of Carlton Administrative and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	City Planner: Suzanne Dufner City Engineer: (Contract: Pete Blumanthall)
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Building Inspector: Gary Briggs City Planner: Suzanne Dufner Public Works Director: Bryan Burnham City Engineer (Contract: Pete Blumanthall) Fire Chief: Terry Lucich
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Building Inspector: Gary Briggs City Planner: Suzanne Dufner City Engineer: (Contract: Pete Blumanthall) Public Works Director: Bryan Burnham Fire Chief: Terry Lucich
Floodplain manager	City Planner: Suzanne Dufner
Personnel skilled in GIS and/or HAZUS-MH	City Planner: Suzanne Dufner
Director of Emergency Services	Fire Chief: Terry Lucich / Police Chief: Frank Butler
Finance (grant writers, purchasing)	City Manager: Steven Weaver
Public Information Officers	City Manager: Steven Weaver

Table C-5. City of Carlton Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	Limited if budgeted
Authority to levy taxes for specific purposes	Limited - no property taxes
Incur debt through general obligation bonds	Revenue bonds on water and sewer-not on property
Incur debt through special tax and revenue bonds	Revenue bonds on water and sewer - not on property
Incur debt through private activity bonds	No
Hazard Mitigation Grant Program (HMGP)	FEMA funding is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding is available on an annual basis. This grant can be used to mitigate and protect repetitively flooded structures and infrastructure.
United State Fire Administration (USFA) Grants	Assists state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000, and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards

Identifying Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.

Element

Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?

Source: FEMA, July 2008.

The City of Carlton's Steering Committee determined that the following hazards could potentially threaten the community. Those hazards identified with an (*) are newly identified by the county as part of the update process.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	X
Wind	X
Erosion*	X
ENSO (El Niño / La Niña)*	X
Expansive Soils*	X
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	X
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	X
Infectious Disease Epidemic*	X

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for the City of Carlton to augment the MHMP development process. It includes:

- Identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?

Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?

Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

The City of Carlton actively participates in FEMA's NFIP and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City of Carlton’s Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

Does the new or updated plan estimate potential dollar losses to vulnerable structures?

Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction’s risks where they vary from the risks facing the entire planning area

Element

Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets within each community potentially affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the City of Carlton’s existing building and infrastructure assets and insured values and is identified in detail in Tables C-6A, C-6B, and C-7.

Tables C-8, C-9, and C-10 portray the City of Carlton’s critical infrastructure numbers and values, and their potential vulnerability by hazard type.

The City of Carlton seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table C-6A were obtained from the 2000 U.S. Census and Portland State University. It contains census block level data, and estimates from university conducted community research.

The City of Carlton’s existing building and infrastructure and insured values are identified in Tables C-6A, C-6B, and C-7

Table C-6A. City of Carlton Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census³	Total Building Count	Total Value of Buildings (\$)¹
1,514	1,585	1,755	628	70,775,600

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$112,700 per structure).

² Yamhill county Taxing Districts: http://www.co.yamhill.or.us/assessor/Documents/2007_Taxing_Districts.pdf

³ Portland State University (PSU) 2007 Oregon Population Report.

Table C-6B. City of Carlton NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties¹
Carlton	825	1	2	303,600	412.50	0	0	0

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

¹Content and building claims.

(Note – many critical facilities and locations have been identified and included in this inventory and risk assessment – due to their confidential nature, their locations have been “shaded” for publication. The data will remain in the report for the County’s future mitigation planning efforts)

Table C-7. City of Carlton Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹ (\$)
Government	US Post Office	438 W. Main St.	767,455
	American Legion Hall	158 E Main Street	329,299
	City Hall / Police Department / Court House / Emergency Ops	191 E. Main St. 45.17.39N 123.10.33W	392,000
Emergency Response	Fire Station	209 Kutch St.	381,000
Educational	Carlton Elementary School (K-8)	420 S. 3rd St.	1,520,215
	Yamhill/Carlton High school (In Yamhill)	275 N. Maple St.	3,553,967
Health Care	Vet Clinic	230 S. Pine St.	269,129
	Mark Miller DDS	133 W. Main St.	498,275
	Family Tree Healthcare	348 S. Pine St.	354,312
Community	Park-Hawn Creek Park	45.17.38N 123.12.11W	432,000
	Park-Upper Park	45.17.38N 123.10.43W	255,288
	Park-Wennerberg Park	45.17.14N 123.11.11W	170,000
	Pool-Carlton Pool	225 W Grant St	130,000
	Carlton Together Cares	226 E. Main St.	145,684
	Carlton Farm/Meat Packing Plant	10600 NW Westside Rd.	1,065,949
	Frontier Custom Meat Cutting Facility/Freezer	455 W. Main St.	802,212
	Western Farm Service Carlton Branch (Fertilizer Plant)	101 W Monroe St	148,880
	Carlton Corners Gas Station	150 N Yamhill St	401,273
	First Baptist Church	500 W. Main St.	417,277
	Grace Baptist Church	221 E Monroe St.	296,369
	Assembly of God Church Facilities	437 S. 3rd St.	1,000,000
	Carlton Community Church	500 E. Main St.	160,000

Table C-7. City of Carlton Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹ (\$)
State and Federal Highways	State-HWY 47	1 mile extent through city	385,000
	County-Hendricks Road	< ½ mile extent	192,500
	County-HWY 240	11 mile extent	4,235,000
	County-Meadow Lake	<1/10 mile extent	38,500
	County-Westside Road	~ 7 mile extent	2,695,000
	City-East Main	1 mile extent	385,000
	City-West Main	1 mile extent	385,000
Bridges	County-Yamhill River (Main Street/Meadow Lake Road) heading west out of town		Unknown
	County-East Main heading east/Hendricks crosses Hahn Creek		1,000,000
Utilities	Water Treatment Plant (1985)		4,700,000
	Wastewater Treatment Plant (1928)		400,000
	Lift Station 1 (Howe)		100,000
	Lift Station 2 (Hahn)		400,000
	Radio Station (KLYC-1260) McMinnville		286,821
	Water Storage Tank 1 (clear well) 300K gallon		325,000
	Water Storage Tank 2 (old reservoir) 500K gallon		400,000
	Water Storage Tank 3 (new) 1 M gallon		828,000
	Bulk Fuel Facility (500 Gallon Gas) (250 Gallon Diesel)		200,000

Table C-7. City of Carlton Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹ (\$)
	Sewage Lagoons		438,000
	Portland General Electric Substation		None listed
	Portland General Electric Substation		None listed
	EMBAQ Telephone Switch Facility		None listed
Dams	Panther Creek Reservoir		325,000

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is discussed in the Yamhill County MHMP, Section 6, which generated the following Hazard Exposure Analysis Overviews. Tables C-8, C-9, and C-10 depict in tabular form results obtained from the GIS analysis depicted in hazard figures located in Appendix K.

Table C-8. City of Carlton Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$)¹	Number	Value (\$)¹
Flood	Moderate	500-year floodplain	--	279	31,443,300	1	unknown
	High	100-year floodplain	--	80	9,016,000	0	unknown
Winter Storm		Descriptive	1,755	628	70,775,600	3	unknown
Landslide	Moderate	14-32 degrees	--	339	38,205,300	2	unknown
	High	>32 degrees	--	--	--	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	628	70,775,600	3	unknown
	High	High fuel rank	--	406	45,756,200	2	unknown
	Very High	Very high fuel rank	--	59	6,649,300	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	628	70,775,600	3	unknown
	Very strong	>20-40% (g)	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--
Volcano		Descriptive	1,755	628	70,775,600	3	unknown
Wind		Descriptive	1,755	628	70,775,600	3	unknown
Erosion*		300' buffer	--	--	--	--	--
El Nino and La Nina		Descriptive	--	--	--	--	--
Expansive Soils*	Moderate	3-6%	--	--	--	--	--
	High	6-9%	--	--	--	--	--

Table C-8. City of Carlton Potential Hazard Exposure Analysis Overview-Population and Buildings

			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$)¹	Number	Value (\$)¹
	Very High	>9%	--	--	--	--	--
Drought		Descriptive	1,755	--	--	--	--
Dam Failure ⁽¹⁾	Significant	Descriptive	1,755	628	70,775,600	3	unknown
Disruption of Utility and Transportation Systems		Descriptive	1,755	--	--	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	539	6,074,530	3	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--
Terrorism		Descriptive	1,755	--	--	--	--
Infectious Disease Epidemic		Descriptive	1,755	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$112,700 per structure). Note-population by parcel was not available at the time this document was prepared. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed.

Table C-9. City of Carlton Potential Hazard Exposure Analysis Overview-Critical Facilities												
			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--	3	7.6M
	High	100-year floodplain	--	--	--	--	--	--	--	--	1	170K
Winter Storm		Descriptive	3	1.5M	1	381K	2	5.1M	3	1.1M	13	5.3M
Landslide	Moderate	14-32 degrees	1	767K	--	--	--	--	--	--	4	1.6M
	High	>32 degrees	--	--	--	--	--	--	--	--	--	--
Wildland Fire	Moderate	Moderate fuel rank	3	1.5M	1	381K	2	5M	3	853K	13	5.4M
	High	High fuel rank	3	1.5M	--	--	--	--	3	853K	7	1.7M
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--
	Very strong	20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		Descriptive	3	1.5M	1	381K	2	5.1M	3	1.1M	13	5.3M
Wind		Descriptive	3	1.5M	1	381K	2	5.1M	3	1.1M	13	5.3M
Erosion		300' buffer	--	--	--	--	--	--	--	--	2	600K
El Nino and La Nina		Descriptive	3	1.5M	1	381K	2	5.1M	3	1.1M	13	5.3M
Expansive Soils	Moderate	3-6%	--	--	--	--	--	--	--	--	1	170K
	High	6-9%	--	--	--	--	--	--	--	--	--	--
	Very High	>9%	--	--	--	--	--	--	--	--	--	--
Drought	Significant	Descriptive	3	1.5M	1	381K	2	5.1M	3	1.1M	13	5.3M
Dam Failure ⁽¹⁾	Significant	NID	3	1.5M	1	381K	2	5.1M	3	1.1M	13	5.3M
Disruption of Utility and Transportation Systems		Descriptive	3	1.5M	1	381K	2	5.1M	3	1.1M	13	5.3M
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	3	1.5M	1	381K	2	5.1M	3	853K	10	3.7M
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	3	1.5M	1	381K	2	5.1M	3	853K	13	5.4M
Terrorism		Descriptive	3	1.5M	1	381K	2	5.1M	3	1.1M	13	5.3M
Infectious Disease Epidemic		Descriptive	--	--	--	--	--	--	--	--	--	--

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Table C-10. City of Carlton Potential Hazard Exposure Analysis Overview-Critical Infrastructure														
			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)¹	Miles	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	1	unknown	--	--	2	838K	--	--
	High	100-year floodplain	--	--	--	--	1	unknown	--	--	1	438K	--	--
Winter Storm		descriptive	23	700K	--	--	2	1M	--	--	13	7.8M	1	325K
Landslide	Moderate	14-32 degrees	--	--	--	--	2	1M	--	--	6	7M	--	--
	High	>32 degrees	--	--	--	--	--	--	--	--	1	828K	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	2	1M	--	--	12	8.4M	--	--
	High	High fuel rank	--	--	--	--	2	1M	--	--	11	8.1M	--	--
	Very High	Very high fuel rank	--	--	--	--	1	1M	--	--	4	5.7M	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	3	5.3M	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	23	700K	--	--	2	1M	--	--	13	7.8M	1	325K
Wind		descriptive	23	700K	--	--	2	1M	--	--	13	7.8M	1	325K
Erosion			--	--	--	--	--	--	--	--	1	400K	--	--
El Nino La Nina			--	--	--	--	--	--	--	--	--	--	--	--
Expansive Soils	Moderate	3-6%	--	--	--	--	1	unknown	--	--	1	438K		
	High	6-9%	--	--	--	--	--	--	--	--	--	--	--	--
	Very High	>9%	--	--	--	--	--	--	--	--	--	--	--	--
Drought		descriptive	23		--	--	2	1M	--	--	13	7.8M	1	325K
Dam Failure ⁽¹⁾		Inundation area	23	700K	--	--	2	1M	--	--	13	7.8M	1	325K
Disruption of Utility and Transportation Systems		descriptive	23		--	--	2	1M	--	--	13	7.8M	1	325K
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	2	700K	--	--	--	--	--	--	4	700K	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	2	700K	--	--	1	unknown	--	--	8	2.6M	--	--
Terrorism		Descriptive	23	700K	--	--	2	1M	--	--	13	7.8M	1	325K

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SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section describes each hazard and the City of Carlton's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA Flood Insurance Rate Maps (FIRMs) were used to outline the 100-year and 500-year floodplains for the City of Carlton. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In the City of Carlton, 80 residential structures (value \$9M), one community facility (value \$170K), one bridge (value unknown), and one utility (value \$438K) are within the boundaries of the 100-year floodplain.

There are 279 residential structures (value \$31.4M), one non-residential structure (value unknown), three community facilities (value \$7.6M), one bridge (value unknown), and two utilities (value \$838K) located within the 500-year floodplain.

Winter Storm

Winter storms have widespread impacts most often the result of the ice, cold, high winds and flooding they bring. Damage to facilities and infrastructure can be severe, depending on the intensity of the storm event.

Since winter storms are regional events, the entire City of Carlton can be equally affected. Therefore 1,755 residents, 588 residential structures (value \$75.3M), three non-residential structures (value unknown), three government facilities (value \$1.5M), one emergency response facility (value \$381k), two educational facilities (value \$5.1M), three care facilities (value \$1.1M), 13 community facilities (value \$5.3M), 23 highway segments (value unknown), two bridges (value \$1M), 13 utilities (value 7.8M), and one dam (value \$325K) are at risk.

Landslide

The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and waste water utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

U.S. Geologic Survey (USGS) elevation datasets were used to determine the landslide hazard areas within the City of Carlton. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, the City of Carlton has 339 residential structures (value \$38.2M), two non-residential structures (value unknown), one government facility (value \$767K), four community facilities (value \$1.6M), two bridges (value \$1M), and six utilities (value \$7M) located in moderate risk areas. One utility (value \$828K) is located within the high risk area.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of modeling.

The City of Carlton has critical facilities and infrastructure located within areas with moderate, high, and very high fuel ranks. Downtown Carlton has limited wildland fire potential. However, the water treatment plant and area surrounding the city has a very high wildland fire hazard threat.

Moderate fuel rank areas contain 628 residential structures (value \$70.8M), three non-residential structures (value unknown), three government facilities (value \$1.5M), one emergency response facility (value \$381K), two educational facilities (value \$5M), three care facilities (value \$853K), 13 community facilities (value \$5.4M), two bridges (value \$1M), and 12 utilities (value \$8.4M).

High fuel rank areas contain 406 residential structures (value \$45.8M), two non-residential structures (value unknown), three government facilities (value \$1.5M), three care facilities (value \$853K), seven community facilities (value \$1.7M), two bridges (value \$1M), and 11 utilities (value \$8.1M).

Very high fuel rank areas contain 59 residential structures (value \$6.65M), one bridge (value \$1M), and four utilities (value \$5.7M).

Extreme fuel rank areas contain three utilities (value \$5.3M).

Earthquake

Based on Peak Ground Acceleration (PGA) shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable slopes. Earthquakes can also trigger other hazards such as dam failure and disruption of transportation and utility systems.

The City of Carlton is in the eastern portion of Yamhill County, in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak

acceleration of the ground caused by the earthquake, and for a strong designation corresponds to 9 to 20 percent of the acceleration of gravity.

The entire City of Carlton can be equally affected by earthquakes. Therefore 1,755 residents, 588 residential structures (value \$75.3M), three non-residential structures (value unknown), three government facilities (value \$1.5M), one emergency response facility (value \$381k), two educational facilities (value \$5.1M), three care facilities (value \$1.1M), 13 community facilities (value \$5.3M), 23 highway segments (value unknown), two bridges (value \$1M), 13 utilities (value 7.8M), and one dam (value \$325K) are at risk to a strong motion earthquake.

Volcano

Ashfall or tephra from volcanic activity is most likely to impact Yamhill County and the City of Carlton. Damage is likely to result from volcanic eruption columns and clouds containing volcanic gases, minerals, and rock. The columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat, and can distribute acid rain as sulfur dioxide gas mixes with water. Because carbon dioxide is heavier than air and can collect in valleys and depressions, the particles can create a risk of suffocation threatening human and animals. Fluorine clings to ash particles and can potentially poison grazing livestock and contaminate domestic water supplies.

However, due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability, although it can be assumed that the entire population (1,755 residents), 588 residential structures (value \$75.3M), three non-residential structures (value unknown), three government facilities (value \$1.5M), one emergency response facility (value \$381k), two educational facilities (value \$5.1M), three care facilities (value \$1.1M), 13 community facilities (value \$5.3M), 23 highway segments (value unknown), two bridges (value \$1M), 13 utilities (value 7.8M), and one dam (value \$325K) are equally at risk.

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Carlton are equally at risk of a windstorm event. Therefore 1,755 residents, 588 residential structures (value \$75.3M), three non-residential structures (value unknown), three government facilities (value \$1.5M), one emergency response facility (value \$381k), two educational facilities (value \$5.1M), three care facilities (value \$1.1M), 13 community facilities (value \$5.3M), 23 highway segments (value unknown), two bridges (value \$1M), 13 utilities (value 7.8M), and one dam (value \$325K) are at risk.

Erosion

Riverine erosion rarely causes death or injury. However, erosion causes significant destruction of property, development, and infrastructure. Erosion hazard data is not readily available; however, descriptions of several localized areas were identified during the development of this document and are identified only by location on a map referencing the river or stream reach

described. Critical facilities at risk from erosion were identified using a 300 foot-buffer in the areas identified as having historic erosion impacts to conservatively account for building footprints.

Two community facilities (value \$600K), one utility (value \$400K), and a water treatment plant (outside city limits) were identified as having a risk of erosion impacts.

Expansive Soils

Shrinking and swelling soils can lead to damaged foundations and structures. The most common damage includes cracking and loss of integrity of building foundations and walls of residential and light (one-or two-story) buildings, highways, canal and reservoir linings, and retaining walls (PCCDD 2006, US Army 1983).

Using National Resource Conservation Service (NRCS) soils data, risk for shrink-swell potential was calculated using the linear extensibility of low (greater than 3 percent), moderate (3 to 6 percent), high (6 to 9 percent), and very high (greater than 9 percent).

The City of Carlton has one community facility (value \$170K), one utilities facility (value \$438K), and one bridge (value unknown) located in expansive soils moderate (3 to 6 percent) risk areas.

Drought

State-wide droughts have historically occurred in Oregon. The region-wide phenomenon puts all residents equally at risk. Structural damage from drought is not expected; the risks apply to humans and resources. Industries important to the City of Carlton's local economy such as agriculture, fishing, and timber have historically been affected, and any future droughts would have tangible economic and potentially human impacts.

Dam Failure

The City of Carlton's Panther Creek Reservoir is approximately 8 miles west of town. The drainage basin above the dam is 3.19 square miles. There has been some erosion caused by tree removal activities by local landowners during the rainy season. There is a main 4.5 mile, 10-inch diameter transmission line to the city, and includes a 6-inch emergency connection to the McMinnville Water and Light main transmission line. However, no agreement exists detailing when the connection can be used (City of Carlton Citizen Involvement and Land Use Planning, 1999).

Dam inundation data is unavailable for Yamhill County; therefore, it is not possible to assess the impacts due to dam failure in this region. However, as determined by the U.S. Army Corps of Engineers and summarized in the National Inventory of Dams, Panther Creek Reservoir is rated as having a Significant hazard risk. Future dam failure could potentially have economic and human impacts and for the purposes of this analysis, all people and facilities are considered equally at risk. This includes 1,755 residents, 588 residential structures (value \$75.3M), three non-residential structures (value unknown), three government facilities (value \$1.5M), one emergency response facility (value \$381k), two educational facilities (value \$5.1M), three care facilities (value \$1.1M), 13 community facilities (value \$5.3M), 23 highway segments (value unknown), two bridges (value \$1M), 13 utilities (value 7.8M), and one dam (value \$325K).

Disruption of Utility and Transportation Systems

Transportation system disruption impacts range from effects on life, health, and safety to economic effects from delays, lost commerce, and lost time. Emergency vehicle mobility and access to hospitals, evacuation routes, and vital supplies can be affected if transport is seriously disrupted for an extended period. Similarly, disruption of utility systems can affect commerce, recreation, and fundamental health and safety in Yamhill County and the City of Carlton. Countywide and citywide disruptions are likely to impact all 1,755 residents equally. Structural damage from disruptions to these systems is not expected; rather the risks apply equally to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the U.S. Environmental Protection Agency's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses generating hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and all facilities within a 0.25 miles radius of transportation routes and EHS facilities are considered at risk.

In the City of Carlton, 539 residential structures (value \$6.1M), three non-residential structures (value unknown), three government facilities (value \$1.5M), one emergency response facility (value \$381K), two educational facilities (value \$5.1M), three care facilities (value \$853K), ten community facilities (value \$3.7M), two highways, and four utilities, (value \$700K) are at risk of the effects from a hazardous materials event.

Three government facilities (value \$1.5M, one emergency response facility (value \$381K), two educational facilities (value \$5.1M), three care facilities (value \$853K), 13 community facilities (value \$5.4M), two highways, one bridge (value unknown) and eight utilities, (value \$2.6M) are located within the 0.25 mile-buffered EHS zone.

Terrorism

It is difficult to determine the scope of any terrorist threat to the City of Carlton. Although there seem to be few high-profile targets present, it is impossible to predict future terrorist events. Depending on the extent of the action, the community may suffer economic loss, disruption of utilities, and cleanup relating to explosions and other facility damages. All facilities and residents are equally at risk of being impacted by this threat.

Pandemic/Epidemic

The consequences of a pandemic could be devastating. In the event of a poor-fit vaccine or very limited vaccine supply, the public health measures include: isolation and quarantine; restricting movement between and within communities; prohibiting public gatherings and group activities; and closing schools.

The county and state have isolation and quarantine laws; cities can also apply quarantines and restrict public movement in a public health emergency. The recently passed public health emergency law in Oregon provides a process for such mechanisms to be implemented (L. Rivers, personal communication; K. Ladd, personal communication).

Impacts associated with infectious disease epidemics in general have the potential to include loss of life and shutdown of critical facilities. Furthermore, an epidemic level of infectious disease in the community could overwhelm local resources, although there are no structural risks or losses associated with this hazard. The entire population is at risk from the effects of an infectious disease epidemic.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?

Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?

Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County's mitigation goals listed in Table C-11, or to revise them to more fully meet the City of Carlton's needs. The committee proceeded to evaluate potential mitigation actions after finalizing the mitigation goals.

Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Table C-12 depicts the City of Carlton's considered mitigation actions developed during this mitigation planning process. The revised list in Table C-14 delineates those actions the city will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?

Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

The City of Carlton actively participates in FEMA's NFIP and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions to fulfill NFIP initiatives, specifically address RL properties. They subsequently selected and prioritized appropriate actions to assure an effective flood mitigation program.

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table C-11. 2006 Yamhill County Mitigation Goals - Considered	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTATIVE <i>Goal Statements:</i> <ul style="list-style-type: none"> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
Natural Hazards			
<i>Multi-Hazard (MH)</i>			
MH	<i>Ongoing</i>	In place	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable).
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.
MH	Consider		Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	Consider	In place	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	<i>Ongoing</i>	In place	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	<i>Ongoing</i>	In Place	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
MH	<i>Ongoing</i>	In Place	Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.
MH	<i>Ongoing</i>		Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to acquire, relocate, elevate, and/or flood proof to protect the threatened population.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
MH	Consider		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
MH	<i>Ongoing</i>	In Place	Develop vegetation projects to restore clear cut and riverine erosion damage and to increase landslide susceptible slope stability.
MH	Consider		Acquire, demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.
MH	<i>Ongoing</i>		Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
MH	<i>Ongoing</i>		Establish a formal role for the jurisdictional Hazard Mitigation Planning Committees to develop a sustainable process to implement, monitor, and evaluate citywide mitigation actions.
MH	Consider		Identify and pursue funding opportunities to implement mitigation actions.
MH	Consider		Develop public and private sector partnerships to foster hazard mitigation activities.
MH	<i>Ongoing</i>		Integrate the Mitigation Plan findings into planning and regulatory documents and programs and into enhanced emergency planning.
MH	Consider		Develop outreach program to encourage residential and business structure retrofit activities for seismic, floods, high winds, earthquakes, or other natural hazards.
Flood			
Flood	<i>Ongoing</i>		Develop and maintain GIS-mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.
Flood	<i>Ongoing</i>		Develop and maintain GIS-mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.
Flood	<i>Ongoing</i>		Develop and maintain GIS-mapped inventory of repetitive loss properties to include the types and numbers of properties.
Flood	<i>Ongoing</i>		Develop and implement mitigation actions for repetitive loss properties.
Flood	<i>Ongoing</i>		Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100- year floodplain using survey elevation data.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	<i>Ongoing</i>		Implement mitigation measures identified by critical facilities' owners, and other facility owners, to protect facilities located within the 100-year floodplain.
Flood	<i>Ongoing</i>		Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current U.S. Army Corps of Engineers flood data.
Flood	<i>Ongoing</i>	In place	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.
Flood	<i>Ongoing</i>	In place	Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
Flood	<i>Ongoing</i>	In place	Develop, implement, and enforce floodplain management ordinances.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof identified properties.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof critical facilities.
Flood	Consider		Install new streamflow and rainfall measuring gauges.
Flood	<i>Ongoing</i>	In place	Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	Consider		Dry flood proof non-residential structures.
Flood	Consider		Dry flood proof historic structures.
Flood	<i>Ongoing</i>	In place	Construct earthen berms to divert flood flows into bridge or culvert openings. The earth fill should be erosion-resistant and the berms should be covered with erosion-resistant fabric, armoring materials, or vegetation.
Flood	<i>Ongoing</i>	In place	Increase culvert size to increase its drainage efficiency.
Flood	<i>Ongoing</i>		Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
Flood	<i>Ongoing</i>		Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
Flood	<i>Ongoing</i>	In place	Create retention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returns to its watercourse at a reduced flow rate.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	<i>Ongoing</i>	In place	Construct an emergency spillway at a dam or other structure to relieve excess water contained during high flow periods to reduce dam failure potential.
Flood	<i>Ongoing</i>		Construct floodwalls around the perimeter of a facility and extending above the highest flood elevation to keep floodwaters away from the facility. Floodwalls can be made from gabion baskets, concrete, large riprap, etc. Floodwalls should be used with caution as they can also act as a catchment preventing drainage away from the facility.
Flood	Consider		Construct low water crossings in a road prism to carry flood flows from an intermittent drainage
Flood	Consider		Create relief drainage ditch opening using a culvert, bridge, or multiple culverts; to relieve rapid water accumulation during high water flow events. .
Flood	Consider		Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
Winter Storm			
Winter Storm	Consider		Develop and implement strategies and educational outreach programs for debris management from severe winter storms.
Winter Storm	Consider		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
Winter Storm	<i>Ongoing</i>		Update or develop, implement, and maintain jurisdictional debris management plans.
Winter Storm	Consider		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	<i>Ongoing</i>		Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.
Winter Storm	Consider		Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
Winter Storm	<i>Ongoing</i>		Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
Winter Storm	Consider		Develop personal use and educational outreach training for a safe tree harvesting program, and implement along utility and road corridors, preventing potential winter storm damage.
Winter Storm	Consider		Purchase NOAA weather radios and develop a web portal linking residents to various weather information sites. (NWS, FEMA, The Weather Channel).
Winter Storm	<i>Ongoing</i>		Develop process to monitor streamflow and precipitation measuring gauges and develop monitoring and early warning program.
Winter Storm	Consider		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
Winter Storm	Consider		Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests.
Winter Storm	<i>Ongoing</i>	In place	Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter Storm	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line severe wind or winter ice storm event failure.
Winter Storm	<i>Ongoing</i>	In place	Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.
<i>Landslide</i>			
Landslide	<i>Ongoing</i>	In place	Complete a landslide location inventory, and identify threatened critical facilities and other buildings and infrastructure.
Landslide	Consider		Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
Landslide	Consider		Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
Landslide	Consider		Develop comprehensive geological landslide and rockslide prone area maps.
Landslide	<i>Ongoing</i>	In place	Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
Wildland Fire			
Wildland Fire	Consider		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Wildland Fire	Consider		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
Wildland Fire	Consider		Develop Community Wildland Fire Protection Plans for all at-risk communities.
Wildland Fire	Ongoing	In place	Provide real-time internet access and interagency cooperation to decrease wildland fire warning times.
Wildland Fire	Ongoing	In place	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
Wildland Fire	Ongoing	In place	Promote FireWise building siting, design, and construction materials.
Wildland Fire	Consider		Retrofit structures with FireWise building design materials.
Wildland Fire	Consider		Develop FireWise Public Service Announcements (PSA).
Wildland Fire	Consider		Provide wildland fire information in an easily distributed format for all residents.
Wildland Fire	Consider		Schedule and perform government facility fire drills at least twice per year.
Wildland Fire	Consider		Conduct residential audits for wildland and building fire hazard identification then develop an outreach program to convey the findings.
Wildland Fire	Ongoing	In place	Develop, adopt, and enforce burn ordinances to require burn permits, restricts campfires, and controls outdoor burning.
Wildland Fire	Ongoing	In place	Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high risk areas.
Wildland Fire	Ongoing		Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.
Wildland Fire	Ongoing		Identify, develop, and implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.
Earthquake			
Earthquake	Consider		Supplement State Seismic Needs Analysis data (schools, fire, and law enforcement). Complete an inventory of public and commercial buildings particularly vulnerable to earthquake damage.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake	Consider		Identify high seismic hazard areas; develop a wood-frame residential building inventory and an outreach program to educate population concerning facilities particularly vulnerable to earthquake damage, such as pre-1940s homes and homes with cripple wall foundations.
Earthquake	Consider		Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Earthquake	Consider		Retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.
Earthquake	<i>Ongoing</i>	In place	Update existing (or adopt the most current) Uniform Building Code
Earthquake	<i>Ongoing</i>	In place	Implement and enforce the Uniform, International, and State Building Codes.
Earthquake	<i>Ongoing</i>	In place	Inspect and/or certify all new construction.
Earthquake	<i>Ongoing</i>		Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.
Earthquake	<i>Ongoing</i>		Develop outreach program to educate the population concerning household, business, and public facility mitigation measures. For example, staff public information tables at fairs, safety events, and festivals.
Earthquake	<i>Ongoing</i>		Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
Earthquake	<i>Ongoing</i>		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.
Earthquake	<i>Ongoing</i>		Identify and prioritize a list of critical facilities with unreinforced masonry problems including non-structural projects such as brick chimney bracing or replacement, water heater bracing, and anchoring, etc.
Earthquake	<i>Ongoing</i>		Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake	<i>Ongoing</i>		Develop outreach program for educating private facilities concerning alternative or emergency power source acquisition to enable them to deliver food, fuel, and medical services during disaster emergency response and recovery efforts.
Earthquake	<i>Ongoing</i>		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Earthquake	<i>Ongoing</i>		Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.
Volcano			
Volcano	Consider		Update public emergency notification procedures and develop an outreach program for ash fall events.
Volcano	Consider		Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.
Volcano	<i>Ongoing</i>	In place	Evaluate capability of water treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.
Volcano	Consider		Evaluate ash impact on storm water drainage system and develop mitigation actions.
Wind			
Wind	Consider		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)
Wind	Consider		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.
Wind	<i>Ongoing</i>	In place	Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.
Wind	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line failure during severe wind or winter ice storm events.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
<i>Erosion</i>			
Erosion	<i>Ongoing</i>	In place	Maintain and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat.
Erosion	<i>Ongoing</i>	In place	Apply for grants/funds to implement riverbank protection methods.
Erosion	Consider		Hold series of community meetings and other outreach efforts to provide erosion hazard specific information to residents.
Erosion	<i>Ongoing</i>	In place	Install bank protection such as rock, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection.
Erosion	<i>Ongoing</i>	In place	Develop outreach program to educate the public concerning planting processes and materials used to stabilize hill slopes or stream banks. This is known as bio-engineering; which uses logs, root wads, or wood debris or other vegetation to reduce scour and erosion.
Erosion	Consider		Harden culvert entrance bottoms with asphalt, concrete, rock, to reduce erosion or scour.
Erosion	Consider		Install flow diverters a short distance into a water body, tied into the bank, to protect from erosion at their end. Designed to redirect water flow away from embankments.
<i>Expansive Soils</i>			
Expansive Soils	Consider		Review construction codes to require non-absorbent fill soils that slope away from foundations for a minimum of five feet to prevent ponding and water retention.
Expansive Soils	Consider		Require building design, engineering, and construction processes that address expansive soil conditions at potentially affected building sites.
Expansive Soils	Consider		Plant trees a distance equal to their mature height away from a structure built on expansive soils. Minimum distance from foundation is 15 feet.
Expansive Soils	Consider		Require road design, engineering, and construction processes that address expansive soil conditions. Water absorption prevention, impermeable membrane, soil compaction, and drainage methods need to be considered once geologic studies determine soil composition.

Table C-12. City of Carlton Mitigation Actions Considered			
Hazard	Status	Comment	Description
<i>Drought</i>			
Drought	Consider		Develop educational programs and initiatives related to water conservation and irrigation during drought periods.
Manmade and Technological Hazards			
<i>Dam Failure</i>			
Dam Failure	Consider		Prepare high resolution dam failure inundation area maps; use to update emergency response plans, evacuation route identification, public notification, and evacuation procedures.
Dam Failure	Consider		Encourage the USACOE to prioritize dams according to hazard risks such as seismic vulnerability and make seismic improvements as necessary.
Dam Failure	Consider		Implement land use and management strategies where dam failure threats dictate.
Dam Failure	Consider		Encourage the USACOE to conduct assessments for dams upstream of populated areas.
Dam Failure	Consider		Evaluate the adequacy of dike systems for both floods and earthquakes and implement mitigation measures as necessary.
<i>Disruption of Utility Systems (DUTS)</i>			
DUTS	Consider		Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.
DUTS	Consider		Review and update emergency response plans for utility disruptions.
DUTS	Consider		Review and update emergency response plans for transportation route disruptions.
DUTS	<i>Ongoing</i>	In place	Identify and prioritize all “jurisdiction owned” & “non-jurisdiction owned” critical facilities that have backup power and emergency operations plans.
DUTS		In place	Purchase backup power systems for all city owned critical facilities.
<i>HAZMAT</i>			
HAZMAT	Consider		Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.
HAZMAT	Consider		Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.

Table C-12. City of Carlton Mitigation Actions Considered

Hazard	Status	Comment	Description
HAZMAT	Consider		Evaluate existing security measures for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS) and enhance security as necessary.
HAZMAT	Consider		Evaluate seismic bracing/anchoring for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS).
HAZMAT	Consider		Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.
HAZMAT	Consider		Develop outreach program to educate the public regarding chemical hazards, safe handling, storage, and disposal procedures.
HAZMAT	Consider		Research, develop, and implement methods to protect waterways from hazardous materials events.
HAZMAT	Consider		Prepare a site-specific summary of hazardous materials used, stored, and commonly transported in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.
<i>Terrorism</i>			
Terrorism	<i>Ongoing</i>		Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.
Terrorism	<i>Ongoing</i>	In place	Upgrade physical security, detection, and response capability for critical facilities using information obtained from hazard assessments and risk analysis. Include water systems and any high-profile facilities such as major timber industry facilities and sites with large quantities of hazardous substances (HS) and extremely hazardous substances (EHS).
Terrorism	<i>Ongoing</i>	In place	Partner with the school district to provide school violence training and mitigation
<i>Infectious Disease Epidemic</i>			
Epidemic	<i>Ongoing</i>		Develop a public health emergency response operations plan that includes, but is not limited to, identification and an inventory of sites with the capacity to treat large numbers of infected individuals and identification of a quarantine facility.
Epidemic	<i>Ongoing</i>		Identify sectors of the population that are vulnerable to potential infectious diseases and develop strategies to communicate and serve those identified populations.

Table C-12. City of Carlton Mitigation Actions Considered			
Hazard	Status	Comment	Description
Epidemic	<i>Ongoing</i>		Determine public health authorities and responsibilities during disaster and emergency situations, e.g., quarantine, shelter hygiene, public sanitation, and immunization.
Epidemic	<i>Ongoing</i>		Research and obtain necessary specialized training for public health officials to respond to an infectious disease epidemic.
Epidemic	<i>Ongoing</i>		Identify state and federal resources for establishing and improving public health response capacity.
Epidemic	<i>Ongoing</i>		Identify appropriate manpower to respond to an infectious disease epidemic.
Epidemic	<i>Ongoing</i>		Establish a detection and information dissemination system for infectious disease epidemic.

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)

Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?

Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?

Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met on September 4, 2008 to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. The committee met again on October 28, 2008 to determine the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

The City of Carlton Steering Committee evaluated the Benefit-Cost Analysis Fact Sheet (Appendix P) for prioritizing its considered mitigation actions listed in Table C-12. The Steering Committee determined they had sufficient expertise to select those mitigation actions most likely to benefit the city without using the STAPLE-E evaluation tool. The Steering Committee assigned a high priority ranking to actions best fulfilling the goals of the MHMP and is appropriate and feasible for the city and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined the existing and new mitigation actions receiving a high priority ranking would be included in the Mitigation Action Plan. Table C-14 depicts the City of Carlton's mitigation actions grouped by hazard and in descending priority order within each hazard.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

The City of Carlton reviewed the Yamhill County goals, and determined they meet the city's needs and subsequently implemented the goals in Table C-13 for the current planning period.

Table C-13. City of Carlton Mitigation Goals	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTATIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan?	
Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?	
Source: FEMA, July 2008.	

Table C-14 displays the City of Carlton's Mitigation Action Plan matrix listing mitigation actions by hazard. These are prioritized within each hazard, not in total. Each mitigation action will be implemented and administered by the applicable managing department, agency, or responsible entity.

***Whenever TBD is used, it means that a benefit/cost analysis will be completed as a project is developed to validate the most appropriate mitigation action.*

Table C-14. City of Carlton Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Natural Hazards						
Multi-Hazard (MH)						
MH	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.	Building	Ongoing	General Funds	BC: TBD TF: Yes	
MH	Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	Public Works	Ongoing	General Funds	BC: TBD TF: Yes	
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	Public Works, School District	1-3 years	General Fund, HSGP, HMGP, School Budget	BC: TBD TF: Yes	
MH	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.	City	Ongoing	General Fund, HMGP, HMA	BC: TBD TF: Yes	
MH	Develop vegetation projects to restore clear cut and riverine erosion damage and to increase landslide susceptible slope stability.	Yamhill Basin Council	2-5 years	General Fund, HMGP, HMA, NRCS, Donations	BC: TBD TF: Yes	

Table C-14. City of Carlton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
MH	Establish a formal role for the Hazard Mitigation Planning Committees to develop a sustainable process to implement, monitor, and evaluate citywide mitigation actions.	City committee	1-3 years	General Fund	BC: TBD TF: Yes	
Flood						
Flood	Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.	Planning Dept.	3-5 years	General Fund, HMA	BC: TBD TF: Yes	
Winter Storm (also addresses Wind hazard mitigation actions)						
Winter Storm	Develop and implement strategies and educational outreach programs for debris management from severe winter storms.	Public Works	1-3 years	Streets Fund, HMGP, HSEP	BC: TBD TF: Yes	
Winter Storm	Develop critical facility list needing emergency back-up power systems, prioritize, seek funding, and implement mitigation actions.	Public Works	Ongoing	General Fund, HMGP, HMA, HSGP	BC: TBD TF: Yes	
Winter Storm	Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.	City	2-4 years	General Fund, HMGP	BC: TBD TF: Yes	
Winter Storm	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.	City	2-4 years	General Fund, HMGP, HMA	BC: TBD TF: Yes	
Winter Storm	Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests.	Police Dept.	2-4 years	General Fund, NOAA/ NWS	BC: TBD TF: Yes	
Landslide (Soils map indicated landslide potential)						
Landslide	Establish a plan/solution to avoid landslides around the Panther Creek Reservoir that supplies water to the City.	BLM	Ongoing	Federal government	BC: TBD TF: Yes	

Table C-14. City of Carlton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Wildland Fire						
Wildland Fire	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.	Fire District	2-4 years	General Fund, FMAP, HMGP	BC: TBD TF: Yes	
Wildland Fire	Schedule and perform government facility "fire drills" at least twice per year.	Fire District	1-3 years	General Fund, FMAP	BC: TBD TF: Yes	
Earthquake (EQ)						
EQ	Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.	School, City	1-3 years	General Fund, HMGP, HMA, NEHRP, School District Budget	BC: TBD TF: Yes	
EQ	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.	Building Dept.	Ongoing	General Fund, HMGP, HMA, NEHRP	BC: TBD TF: Yes	
EQ	Identify and prioritize a list of critical facilities with unreinforced masonry problems including non-structural projects such as brick chimney bracing or replacement, water heater bracing, and anchoring, etc.	Building Dept.	2-4 years	General Fund	BC: TBD TF: Yes	
Volcano						
Volcano	Update public emergency notification procedures and develop an outreach program for ash fall events.	Police Dept. Fire Dept.	3-5 years	General Fund, NOAA/ NWS	BC: TBD TF: Yes	
Erosion						
Erosion	Apply for grants/funds to implement riverbank protection methods.	Yamhill Basin Council	3-5 years	General Fund, HMGP, HMA, NRCS, Donations	BC: TBD TF: Yes	
Drought						
Drought	Develop educational programs and initiatives related to water conservation and irrigation during drought periods.	City	Ongoing	Water Fund, NRCS,	BC: TBD TF: Yes	

Table C-14. City of Carlton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Manmade and Technological Hazards						
Dam Failure						
Dam Failure	Prepare high resolution dam failure inundation area maps; use to update emergency response plans, evacuation route identification, public notification, and evacuation procedures.	Yamhill County	2-5 years	General Fund, County Budget	BC: TBD TF: Yes	
Disruption of Utility and Transport Systems (DUTS)						
DUTS	Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.	City	2-5 years	General Fund, HMGP, IECCP, CEDAP	BC: TBD TF: Yes	
Hazardous Materials (HAZMAT)						
HAZMAT	Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.	Police Dept.	1-3 years	General Fund, CERCLA, SARA, CEDAP, HSGP,	BC: TBD TF: Yes	
Terrorism						
Terrorism	Partner with the school district to provide school violence training and mitigation	Police Dept./School district	2-4 years	General Fund, AWARE, HSGP, CTGP, CTGP, School Budget	BC: TBD TF: Yes	
Infectious Disease Epidemic						
Epidemic	Determine public health authorities and responsibilities during disaster and emergency situations, e.g., quarantine, shelter hygiene, public sanitation, and immunization.	Police Dept./County Health	2-4 years	General fund, County budget	BC: TBD TF: Yes	

Appendix D
City of Dayton

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This appendix contains information about the City of Dayton, Oregon in support of the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section describes the City of Dayton's planning process by listing Steering Committee membership, documenting public outreach efforts, and summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process. Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The City of Dayton is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill the goal, the city organized a MHMP development Steering Committee dedicated to identifying hazard threats and developing actions to mitigate damage and life losses from those threats.

Table D-1 contains the City of Dayton Steering Committee participant list to augment the Yamhill County MHMP planning elements.

Table D-1. City of Dayton Steering Committee	
Name	Agency/Department/Affiliation
Ross Schultz	Current City Manager
Sue Hollis	City Manager 4/2008 through 10/2008
Jolie White	Mayor
Pat Jackson	Public Works

Table D-2 contains the summary of the City of Dayton's public involvement and planning meeting activities.

Table D-2. City of Dayton Public Involvement Mechanisms	
Mechanism	Description
Newsletter	Distribution with utility bills June 30, 2008 to introduce project and request public input
Newsletter	Distribution with utility bills August 2008 to provide project update and invite public to meeting to discuss draft risk assessment results
Public Meeting	Held August 15 and 18, 2008 to present draft risk assessment results

CAPABILITY ASSESSMENT

Table D-3, D-4, and D-5 contain the City of Dayton's resources used to support planning activities, including reports and studies reviewed as part of the update process.

Table D-3. City of Dayton Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Comprehensive Land Use	Guides development in Dayton-Plan for Growth (May 1979, Updated and Adopted December 1986)
	Transportation Plan	Guides internal traffic flow and state and county road traffic flow
	Parks Plan	Guides development of current parks and future parks
	Downtown Development Plan	Encourages and guides downtown development
	Water System Master Plan	Finalizing in 2008
	Sewer System Master Plan	Finalizing in 2008
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
	Wetlands	No official program, but do consider effects on wetlands from development during planning
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency.
	Title 8.70 Hazardous Materials Releases	Provides procedures for coordination among various agencies in the event of hazardous materials releases.
	Land Use and Development Code	Defines development criteria and building regulations (2007)
	Floodplain Ordinances	Delineates development, building codes, and land-use regulations
	Water and Sewer Codes	Related to construction
	Public Works Standards	Related to construction

Table D-4. City of Dayton Administrative and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Contract-Mid Willamette Valley Council of Governments
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	City Engineer-Westech Engineering Inc.
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	City Engineer-Westech Engineering Inc.
Floodplain manager	Sue Hollis - City Manager
Personnel skilled in GIS and/or HAZUS-MH	City Engineer-Westech Engineering Inc.
Director of Emergency Services	Yamhill County
Finance (grant writers, purchasing)	Purchasing in house (all department heads); occasionally hire grant writers (various) and Mid Willamette Valley Council of Governments
Public Information Officers	City Manager

Table D-5. City of Dayton Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	Limited, Yes
Authority to levy taxes for specific purposes	Yes, with voter approval
Incur debt through general obligation bonds	Yes
Incur debt through special tax and revenue bonds	Yes
Incur debt through private activity bonds	Likely no
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000, and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards

Identifying Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.

Element

- Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?

Source: FEMA, July 2008.

The City of Dayton's Steering Committee determined the following hazards could potentially threaten the community. Those hazards identified with an (*) are newly identified by the county as part of the update process – those identified with an (x) are specific to the City of Dayton.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	X
Wind	X
Erosion*	X
ENSO (El Niño / La Niña)*	X
Expansive Soils*	
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	
Infectious Disease Epidemic*	

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for the City of Dayton to augment the MHMP development process. It includes:

- Identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

The City of Dayton actively participates in FEMA's National Flood Insurance Program (NFIP) and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The city's mitigation strategy identified and analyzed potential flood mitigation actions to fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS: SPECIFIC STEPS

Asset Inventory

An asset inventory is the first step of a vulnerability analysis. Assets within the City of Dayton potentially affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the city's existing building and infrastructure assets and insured values and is identified in detail in Tables D-6A, D-6B, and D-7.

Tables D-8, D-9, and D-10 portray the city's critical infrastructure numbers and values, and their potential vulnerability by hazard type.

The City of Dayton seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development to the extent the law will allow, buildings, infrastructure, and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table D - 6A below were obtained from the 2000 U.S. Census and Portland State University. It includes census block level data and estimates from university conducted community research.

The City of Dayton's existing building and infrastructure and insured values are identified in Tables D-6A, D-6B, and D-7.

Table D-6A. City of Dayton Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census³	Total Building Count	Total Value of Buildings (\$)
2,119	2,280	2,495	713	85,560,000 ²

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

² Yamhill county Taxing Districts: http://www.co.yamhill.or.us/assessor/Documents/2007_Taxing_Districts.pdf

³ Portland State University (PSU) 2007 Oregon Population Report.

Table D -6B. City of Dayton NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties²
Dayton	1996	0	5	819,400	399.20	0	0	0

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

²Content and building claims.

(Note – many critical facilities and locations have been identified and included in this inventory and risk assessment – due to their confidential nature, their locations have been “shaded” for publication. The data will remain in the report for the County’s future mitigation planning efforts)

Table D-7. City of Dayton Critical Facilities and Infrastructure			
Facility Type	Name / Number	Address	Value¹
Government	City Hall	416 Ferry St.	\$688,568
	Community Center (City Hall Annex)		\$657,281
	Public Works Shops	416 Ferry St., Dayton	\$146,091
	US Post Office	530 Ferry Street	\$350,000
	City Streets		\$7,000,000
Emergency Response	Fire District Office		\$3,000,000
	County Sheriff Sub-Station	(Inside Annex Bldg)	\$50,000
Educational	Dayton Head Start	528 Ferry St.	\$50,000
	Dayton Elementary School	526 Ferry St.	\$6,687,547
	Dayton Middle/Junior High School	801 Ferry St.	\$731,931
	Dayton High School	801 Ferry St.	\$4,486,769
Health Care	Berry Adult Care Facility for handicap and mentally disabled		\$500,000
	Palmer Creek Apts - 8 unit facility of elderly and handicap	206 Mill Street	\$2,000,000
Community	Farm Worker Housing (Fresa Park)	955 Ferry St.	\$500,000
	11 th St. Park	11 th & Church Street	\$300,000
	Alderman Park	SE Kreder Rd& Yamhill River	\$300,000
	Park-Courthouse Square Park (restrooms, playground, covered picnic area, bandstand, historic blockhouse, fountain)	3 rd , 4 th , Main & Ferry	\$210,000
	The Dayton Pioneer Church	300 4th St.	Unknown
	First Baptist Church	300 Flower Lane	Unknown
	Dayton Christian Church	302 5th St.	Unknown
	San Martin Catholic Church	405 Ferry St.	Unknown
	Church of Christ of Latter Day Saints	700 Ash St.	Unknown
	Jehovah's Witness	16985 SE Neck Rd	Unknown
	Makinster Mae's Mosgrove	304 5th St.	Unknown
	Hopewell Community Church	21500 SE Church Rd	\$166,970
Community			

Table D-7. City of Dayton Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	Full Gospel Assembly Church	411 Oak St.	\$171,827
	Cross Grace	406 Church St.	\$35,694
	Mary Gilkey Public Library	(Inside City Hall)	\$500,000
State and Federal Highways	Hwy 155		½ Mile
	Hwy 221		In Town
	Hwy 18	Adjacent to City Limits	½ Mile
Bridges	Foot Bridge (wooden suspension bridge)-carries water & sewer lines		\$4-6,000,000
	Hwy 221 Bridge		\$15,000,000
	Overpass at Hwy 18		\$15,000,000
Utilities	Nextel Wireless company		Unknown
	Verizon Telephone		Unknown
	Lift station #1		\$250,000
	Lift station #2		\$250,000
	Lift station #3		\$250,000
	Lift station #4		\$250,000
	Sewer Lagoon #1, chlorination & dechlorination building		\$1,250,000
	Sewer Lagoon #2, chlorination & dechlorination building		\$1,250,000
	Sewer Lagoon #3, chlorination & dechlorination building		\$1,250,000
	Sewer Lagoon #4, chlorination & dechlorination building		\$1,250,000
	Sewer Lagoon #5, chlorination & dechlorination building		\$1,250,000
	Breyman Watershed:		\$2,000,000
	Reservoir 1 (open concrete reservoirs <100,000 gal)		\$500,000

Table D-7. City of Dayton Critical Facilities and Infrastructure			
Facility Type	Name / Number	Address	Value ¹
	Reservoir2 (open concrete reservoirs <100,000 gal)		\$500,000
	1 steel reservoir 980,000 gal		\$500,000
	1 below ground concrete reservoir (300,000 gal)		\$1,000,000
	1 slow sand filter; chlorination bldg pressure reducing valve		\$1,000,000
	Enclosed Water Tank 1.5 mil gallons		\$625,000
Utilities	8 Community Potable Water Wells		\$200,000 ea
	Breyman Springs-12		\$1,200,000
	Comcast Cable Television		Unknown
	Landfill (Riverbend in county)		Unknown
	Water Treatment Facility		\$3,000,000
	Portland General Electric McMinnville Water & Light		Unknown

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is discussed in the Yamhill County MHMP, Section 6. The following Hazard Exposure Analysis Overviews were generated based on the process. Tables D-8, D-9, and D-10 depict in tabular form results obtained from the GIS analysis shown in the hazard figures located in Appendix K.

Table D-8. City of Dayton Potential Hazard Exposure Analysis Overview-Population and Buildings

			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$) ¹	Number	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	274	32,880,000	--	--
	High	100-year floodplain	--	227	27,240,000	--	--
Winter Storm		descriptive	2,495	713	85,560,000	1	Unknown
Landslide	Moderate	14-32 degrees	--	385	46,200,000	--	--
	High	>32 degrees	--	182	21,840,000	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	713	85,560,000	1	Unknown
	High	High fuel rank	--	439	52,680,000	--	--
	Very High	Very high fuel rank	--	126	15,120,000	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--
Earthquake	Strong	9-20% (g)	2,495	713	85,560,000	1	Unknown
	Very strong	>20-40% (g)	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--
Volcano		descriptive	2,495	713	85,560,000	1	Unknown
Wind		descriptive	2,495	713	85,560,000	1	Unknown
Erosion		300' buffer	--	--	--	--	--
El Nino and La Nina		descriptive	2,495	--	--	--	--
Drought		descriptive	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	2,495	--	--	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	507	60,840,000	1	Unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$120,000 per structure). Note-population by parcel was not available at the time this document was prepared. 0.25 mile-buffered EHS sites were not able to be calculated due to the use of census block level data. Once this data is available, a useful analysis of population and residential structures by hazard can be completed.

Table D-9. City of Dayton Potential Hazard Exposure Analysis Overview-Critical Facilities												
			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$)	No.	Value (\$)	No.	Value (\$)	No.	Value (\$)	No.	Value (\$)
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	1	2M	--	--
	High	100-year floodplain	--	--	--	--	--	--	--	--	1	unknown
Winter Storm		descriptive	5	8.9M	2	3M	4	12M	2	2.5M	15	2.2M
Landslide	Moderate	14-32 degrees	1	350K	1	3M	2	6.7M	2	2.5M	5	839K
	High	>32 degrees	--	--	--	--	--	--	1	2M	1	167K
Wildland Fire	Moderate	Moderate fuel rank	4	1.8M	2	3M	4	11.9M	2	2.5M	15	2.2M
	High	High fuel rank	3	1.5M	2	3M	4	11.9M	2	2.5M	10	1.7M
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	5	8.9M	2	3M	4	12M	2	2.5M	15	2.2M
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	5	8.9M	2	3M	4	12M	2	2.5M	15	2.2M
Wind		descriptive	5	8.9M	2	3M	4	12M	2	2.5M	15	2.2M
Erosion		300' buffer	3	1.5M	2	3M	1	6.7M	1	2M	4	972K
El Nino and La Nina		descriptive	5	8.9M	2	3M	4	12M	2	2.5M	15	2.2M
Drought		descriptive	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	5	8.9M	2	3M	4	12M	2	2.5M	15	2.2M
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	4	1.8M	2	3M	2	6.7M	2	2.5M	13	1.5M
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	4	1.8M	2	3M	4	11.9M	2	2.5M	14	2M

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Table D-10. City of Dayton Potential Hazard Exposure Analysis Overview-Critical Infrastructure														
			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)¹	Miles	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	3	36M	--	--	9	7M	--	--
	High	100-year floodplain	--	--	--	--	3	36M	--	--	4	750K	--	--
Winter Storm		descriptive	1	unknown	--	--	3	36M	--	--	24	19.5M	--	--
Landslide	Moderate	14-32 degrees	--	--	--	--	2	30M	--	--	14	10.8M	--	--
	High	>32 degrees	--	--	--	--	--	--	--	--	--	--	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	3	36M	--	--	21	17.6M	--	--
	High	High fuel rank	--	--	--	--	3	36M	--	--	21	17.6M	--	--
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	2	250K	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	1	unknown	--	--	3	36M	--	--	24	19.5M	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	1	unknown	--	--	3	36M	--	--	24	19.5M	--	--
Wind		descriptive	1	unknown	--	--	3	36M	--	--	24	19.5M	--	--
Erosion		300' buffer			--	--	3	36M	--	--	3	750K	--	--
El Nino and La Nina		descriptive	1	unknown	--	--	3	36M	--	--	24	19.5M	--	--
Drought		descriptive	1	unknown	--	--	3	36M	--	--	24	19.5M	--	--
Disruption of Utility and Transportation Systems		descriptive	1	unknown	--	--	3	36M	--	--	24	19.5M	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	3 unknown	unknown	--	--	3	36M	--	--	14	10.8M	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	3 unknown	unknown	--	--	3	36M	--	--	16	13.7M	--	--

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SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section describes each hazard and the community's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

These assessments were performed using the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA Flood Insurance Rate Maps (FIRMs) were used to outline the 100-year and 500-year floodplains for the City of Dayton. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In the City of Dayton, 227 residential structures (worth \$27.2M), one community facility (value unknown), three bridges (worth \$36M), and four utilities (worth \$750K) are located within the boundaries of the 100-year floodplain.

There are 274 residential structures (worth \$32.9M), one care facility (worth \$2M), three bridges (worth \$36M), and nine utilities (worth \$7M) found within the boundaries of the 500-year floodplain.

Winter Storm

Winter storms have widespread impacts resulting from ice, cold, high winds and flooding. Damage to facilities and infrastructure can be severe depending on the intensity of the storm event.

Since winter storms are regional events, the entire City of Dayton can be equally affected. Therefore 2,495 residents, 713 residential structures (value \$85.6M), one non-residential structure (value unknown), five government facilities (value \$8.9M), two emergency response facilities (value \$3M), four educational facilities (value \$12M), two care facilities (value \$2.5M), 15 community facilities (value \$2.2M), one highway segment (value unknown), three bridges (value \$36M), and 24 utilities (value \$19.5M) are at risk.

Landslide

The potential impacts from landslides can be widespread. Debris flows and landslides can impact transportation and rail routes, utility systems, and water and wastewater treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts vary from minor cleanup to more extensive utility system reconstruction. Utility disruptions are usually local and terrain dependent, and sometimes require reestablishing electrical power, communication, and gas pipeline connections at breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and wastewater may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability at the water and wastewater treatment plants.

U.S. Geologic Survey (USGS) elevation datasets were used to determine the landslide hazard areas within the City of Dayton. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, the City of Dayton has 385 residential structures (worth \$46.2M), one government facility (worth \$350K), two educational facilities (worth \$6.7M), one emergency response facility (worth \$3M), two care facilities (worth \$2.5M), five community facilities (worth \$839K), two bridges (worth \$30M), and 14 utilities (worth \$10.8M) located in areas of moderate risk.

There are 182 residential structures (worth \$21.8M), one care facility (worth \$2M), one community facility (worth \$167K), and two utilities (worth \$250K) located within areas of high risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

The City of Dayton has critical facilities and infrastructure located within areas with moderate, high, and very high fuel ranks. Moderate fuel rank areas contain 713 residential structures (worth \$85.6M), one non-residential structure (value unknown), four government facilities (worth \$1.8M), two emergency response facilities (worth \$3M), four educational facilities (worth \$11.9M), two care facilities (worth \$2.5M), 15 community facilities (worth \$2.2M), three bridges (worth \$36M), and 21 utilities (worth \$17.6M).

High fuel rank areas contain 439 residential structures (worth \$52.7M), three government facilities (worth \$1.5M), two emergency response facilities (worth \$3M), four educational facilities (worth \$11.9M), two care facilities (worth \$2.5M), ten community facilities (worth \$1.7M), three bridges (worth \$36M), and 21 utilities (worth \$17.6M).

Very high fuel rank areas contain 126 residential structures (worth \$15.1M) and two utilities (worth \$250K).

Earthquake

Based on Peak Ground Acceleration (PGA) shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas is likely to cause damage to weak, unreinforced masonry buildings and to induce small landslides along unstable slopes. Earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The City of Dayton is in the eastern portion of Yamhill County, in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak

acceleration of the ground caused by the earthquake. A strong designation corresponds to 9 to 20 percent of the acceleration of gravity.

The entire City of Dayton can be equally affected. Therefore 2,495 residents, 713 residential structures (value \$85.6M), one non-residential structure (value unknown), five government facilities (value \$8.9M), two emergency response facilities (value \$3M), four educational facilities (value \$12M), two care facilities (value \$2.5M), 15 community facilities (value \$2.2M), one highway segment (value unknown), three bridges (value \$36M), and 24 utilities (value \$19.5M) are at risk of strong shaking earthquakes.

Volcano

Ashfall or tephra from volcanic activity is most likely to impact Yamhill County and the City of Dayton. Damage is likely to result from volcanic eruption columns and clouds containing volcanic gases, minerals, and rock. The columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat and can distribute acid rain as sulfur dioxide gas mixes with water. Because carbon dioxide is heavier than air and collect in valleys and depressions, humans and animals are threatened by the risk of suffocation. Fluorine clings to ash particles and can poison grazing livestock and contaminate domestic water supplies.

It is impossible to predict the location or extent of future events with any probability. Therefore 2,495 residents, 713 residential structures (value \$85.6M), one non-residential structure (value unknown), five government facilities (value \$8.9M), two emergency response facilities (value \$3M), four educational facilities (value \$12M), two care facilities (value \$2.5M), 15 community facilities (value \$2.2M), one highway segment (value unknown), three bridges (value \$36M), and 24 utilities (value \$19.5M) are at risk.

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Dayton are equally at risk of a windstorm event. Therefore 2,495 residents, 713 residential structures (value \$85.6M), one non-residential structure (value unknown), five government facilities (value \$8.9M), two emergency response facilities (value \$3M), four educational facilities (value \$12M), two care facilities (value \$2.5M), 15 community facilities (value \$2.2M), one highway segment (value unknown), three bridges (value \$36M), and 24 utilities (value \$19.5M) are at risk.

Erosion

Riverine erosion rarely causes death or injury. However, erosion causes significant destruction of property, development, and infrastructure. Erosion hazard data is not readily available. Descriptions of several localized areas potentially susceptible to erosion were identified during the development of this document. These areas are identified by map location and reference the river or stream reach described. Critical facilities at risk of erosion were identified using a 300

foot-buffer in the areas identified as having historic erosion impacts to conservatively account for building footprints.

Three government facilities (worth \$1.5M), two emergency response facilities (worth \$3M), 1 care facility (worth \$2M), one educational facility (worth \$6.7M), four community facilities (worth \$972K), three bridges (worth \$36M), and three utilities (worth \$750K) were identified in the City of Dayton to be at risk from erosion impacts.

ENSO (El Niño and La Niña)

ENSO (El Niño and La Niña) events cause large scale weather pattern changes throughout Yamhill County and across the entire State of Oregon. In the City of Dayton, El Niño periods are generally drier, with an increased likelihood of drought. La Niña periods tend to be wetter and colder with an increased risk of winter storms, flooding, and landslides.

ENSO effects are large scale, and local impacts are difficult to quantify. Instead, ENSO is manifested in the hazards it influences, such as winter storms, flooding, landslides, and drought. Therefore, the quantitative impacts have been summarized in those categories.

Drought

State-wide droughts have historically occurred in Oregon. The region-wide phenomenon can impact all residents equally. Structural damage from drought is not expected; rather the risks apply to humans and resources. Industries important to the City of Dayton's local economy such as agriculture, fishing, and timber have historically been affected, and any future droughts would have tangible economic and potentially human impacts.

Disruption of Utility and Transportation Systems

Transportation system disruption impacts range from effects on life, health, and safety to economic effects from delays, lost commerce, and lost time. Emergency vehicle mobility and access to hospitals, evacuation routes, and vital supplies can be affected if transport is seriously disrupted for an extended period. Similarly, disruption of utility systems can affect commerce, recreation, and fundamental health and safety in Yamhill County and the City of Dayton. Countywide and citywide disruptions are likely to impact all residents equally. Structural damage from disruptions to these systems is not expected; rather the risks apply equally to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the U.S. Environmental Protection Agency's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses generating hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and all facilities within a 0.25 miles radius of a transportation route or an EHS facility are considered at risk.

In the City of Dayton, 507 residential structures (worth \$60.8M), four government facilities (worth \$1.8M), two emergency response facilities (worth \$3M), two educational facilities (worth \$6.7M), two care facilities (worth \$2.5M), 13 community facilities (worth \$1.5M), three highways (values unknown), three bridges (worth \$36M), and 14 utilities (worth \$10.8M) are considered at risk.

Four government facilities (worth \$1.8M), two emergency response facilities (worth \$3M), four educational facilities (worth \$11.9M), two care facilities (worth \$2.5M), 14 community facilities (worth \$2M), three highways (values unknown), three bridges (worth \$36M), and 16 utilities (worth \$13.7M) are located within the 0.25 mile-buffered EHS zone.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County's mitigation goals listed in Table D-11, or to revise them to more fully meet the City of Dayton's needs. The committee then evaluated potential mitigation actions.

Mitigation actions are activities, measures, or projects used to achieve the goals of a mitigation plan. Table D-12 shows Dayton's considered mitigation actions developed during this mitigation planning process. The revised list in Table D-13 delineates those goals the city wishes to adopt, and Table D -14 shows the actions the city will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

The City of Dayton actively participates in FEMA’s NFIP and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City of Dayton’s Mitigation Strategy identified and analyzed potential flood mitigation actions to fulfill NFIP initiatives, specifically addressing RL properties. They subsequently selected and prioritized city appropriate actions to assure an effective flood mitigation program

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table D-11. 2006 Yamhill County Mitigation Goals-Considered	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

Table D-12. City of Dayton Mitigation Actions Considered

Hazard	Status	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
MH	<i>Ongoing</i>		Continue to enforce building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>		Continue to restrict mobile home location in flood hazard areas (require on foundation & elevated above floodplain)
MH	<i>Ongoing</i>		Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	<i>Ongoing</i>		Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	<i>Ongoing</i>		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	Completed	In place	Install surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.
MH	Consider		Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
MH	Completed		Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.
MH	Consider		Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to acquire, relocate, elevate, and/or flood proof to protect the threatened population.
MH	<i>Ongoing</i>		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
Flood			
Flood	<i>Ongoing</i>		Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.
Flood	<i>Ongoing</i>		Develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.
Flood	Consider		Develop and maintain GIS mapped inventory of repetitive loss properties to include the types and numbers of properties.

Table D-12. City of Dayton Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	Consider		Develop and implement mitigation actions for repetitive loss properties.
Flood	Consider		Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100- year floodplain using survey elevation data.
Flood	Consider		Implement mitigation measures identified by critical facilities' owners, and other facility owners, to protect facilities located within the 100-year floodplain.
Flood	Consider		Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.
Flood	Consider		Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
Flood	Ongoing		Develop, implement, and enforce floodplain management ordinances.
Flood	Ongoing		Acquire, relocate, elevate, or otherwise flood-proof identified properties.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof critical facilities.
Flood	Consider		Install new streamflow and rainfall measuring gauges.
Flood	Completed	Past Studies Completed	Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	Ongoing		Inventory culverts in need of modification to increase culvert size to increase its drainage efficiency.
Flood	Consider		Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.
Flood	Ongoing		Construct floodwalls around the perimeter of a "facility" and extending above the highest flood elevation to keep floodwaters away from the facility. Floodwalls can be made from gabion baskets, concrete, large riprap, etc. Floodwalls should be used with caution as they can also act as a catchment preventing drainage away from the facility.
Flood	Completed	Completed for Sewage Lagoon	Install triangular or circular flow deflectors on or immediately upstream from bridge footings to deflect water flow and reduce flow velocities preventing footing scour.
Flood	Ongoing		Change under-bridge utility location to under-river
Flood	Consider		Create relief drainage ditch opening using a culvert, bridge, or multiple culverts; to relieve rapid water accumulation during high water flow events. .
Flood	Ongoing		Construct concrete wing walls at culvert or bridge entrances and outlets to direct water flow into their openings
Flood	Consider		Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
Flood	Ongoing		Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.

Table D-12. City of Dayton Mitigation Actions Considered

Hazard	Status	Comment	Description
Winter Storm			
Winter Storm	Consider		Develop and implement strategies and educational outreach programs for debris management from severe winter storms.
Winter Storm	<i>Ongoing</i>		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
Winter Storm	Consider		Coordinate with County debris management plans.
Winter Storm	<i>Ongoing</i>		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	Consider		Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.
Winter Storm	<i>Ongoing</i>		Continue tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
Winter Storm	<i>Ongoing</i>		Maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages in new development from severe winter storms. Consider developing incentive programs.
Winter Storm	Consider	In place	Develop personal use and educational outreach training for a “safe tree harvesting” program. Implement along utility and road corridors, preventing potential winter storm damage.
Winter Storm	<i>Ongoing</i>		Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests.
Winter Storm	<i>Ongoing</i>		Implement and enforce the most current Uniform State Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter Storm	<i>Ongoing</i>		Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.
Landslide			
Landslide	Consider		Complete a landslide location inventory, identify threatened critical facilities and other buildings and infrastructure.
Wildland Fire			
Wildland Fire	Consider		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Wildland Fire	Consider		Create partnership to educate and mitigate wildland fire risk with the fire department.
Wildland Fire	Consider		Schedule and perform government facility “fire drills” at least twice per year.
Wildland Fire	<i>Ongoing</i>		Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.

Table D-12. City of Dayton Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake			
Earthquake	<i>Ongoing</i>		Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.
Earthquake	<i>Ongoing</i>		Maintain a wood-frame residential building inventory and an outreach program to educate population concerning facilities particularly vulnerable to earthquake damage, such as pre-1940s homes and homes with cripple wall foundations.
Earthquake			Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Earthquake		In place	Retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.
Earthquake	<i>Ongoing</i>	In place	Update existing (or adopt the most current) Uniform Building Code
Earthquake	<i>Ongoing</i>	In place	Implement and enforce the Uniform Building Codes.
Earthquake	<i>Ongoing</i>		Inspect and/or certify all new construction.
Earthquake	Consider		Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.
Earthquake	<i>Ongoing</i>		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.
Earthquake	Consider		Identify and prioritize a list of critical facilities with unreinforced masonry problems including non-structural projects such as brick chimney bracing or replacement, water heater bracing, and anchoring, etc.
Earthquake	Consider		Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.
Earthquake	Consider		Develop outreach program for educating private facilities to enable them to deliver food, fuel, and medical services during disaster emergency response and recovery efforts.
Earthquake	Consider		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Earthquake	<i>Ongoing</i>		Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.
Volcano			
Volcano	<i>Ongoing</i>		Update public emergency notification procedures and develop an outreach program for ash fall events.
Volcano	Consider		Evaluate capability of sewage lagoon to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.
Volcano	Consider		Evaluate ash impact on storm water drainage system and develop mitigation actions.

Table D-12. City of Dayton Mitigation Actions Considered

Hazard	Status	Comment	Description
Wind			
Wind	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)
Wind	<i>Ongoing</i>		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.
Wind	<i>Ongoing</i>		Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.
Erosion			
Erosion	Consider		Maintain and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat.
Erosion	<i>Ongoing</i>		Continue to regulate development in erosion prone areas
Erosion	<i>Ongoing</i>		Continue outreach program to educate the public concerning planting processes and materials used to stabilize hill slopes or stream banks. This is known as bio-engineering; which uses logs, root wads, or wood debris or other vegetation to reduce scour and erosion. (Partnership with watershed council)
Erosion	Consider		Install bank revetment protection to prevent erosion.
Erosion	<i>Ongoing</i>		Maintain erosion protection by city park at city sewer outfall header
Erosion	<i>Ongoing</i>		Coordinate with county to protect county park boat landing
ENSO (El Niño / La Niña)			
ENSO (El Niño/ La Niña)	Consider		Educate public regarding weather patterns associated with El Niño / La Niña.
Disruption of Utility and Transport Systems (DUTS)			
DUTS	<i>Ongoing</i>		Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.
DUTS	Consider		Review and update emergency response plans for utility disruptions.
DUTS	Consider		Review and update emergency response plans for transportation route disruptions.
DUTS	Consider		Identify and prioritize all "jurisdiction owned" & "non-jurisdiction owned" critical facilities that have backup power and emergency operations plans.
DUTS	<i>Ongoing</i>		Purchase backup power systems for all identified critical facilities.
HAZMAT			
HAZMAT	<i>Ongoing</i>	In place	Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.
HAZMAT	<i>Ongoing</i>	In place	Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.

Table D-12. City of Dayton Mitigation Actions Considered			
Hazard	Status	Comment	Description
HAZMAT	<i>Ongoing</i>	In place	Evaluate existing security measures for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS) and enhance security as necessary.
HAZMAT	<i>Ongoing</i>		Evaluate seismic bracing/anchoring for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS). (Propane, not bulk fuel)
HAZMAT	<i>Ongoing</i>		Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.
HAZMAT	<i>Ongoing</i>		Research, develop, and implement methods to protect waterways from hazardous materials events.
HAZMAT	<i>Ongoing</i>		Prepare a site-specific summary of hazardous materials used and stored in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met on several occasions to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. The committee then met to determine the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

The City of Dayton Steering Committee evaluated the Benefit-Cost Analysis Fact Sheet (Appendix P) for prioritizing its considered mitigation actions listed in Table D-12. The Steering Committee determined it has sufficient expertise to select the most beneficial mitigation actions without using the STAPLE-E evaluation tool. Upon review, the Steering Committee assigned a high priority ranking to actions best fulfilling the goals of the MHMP and is appropriate and feasible for the City of Dayton and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined the existing and new mitigation actions receiving a high priority ranking would be included in the countywide Mitigation Action Plan. Table D-14 depicts the city's mitigation actions grouped by hazard and in descending priority order within each hazard.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

The City of Dayton reviewed the Yamhill County goals and determined they meet the City's needs and subsequently implemented the goals in Table D-13 for the current planning period.

Table D-13. City of Dayton Mitigation Goals	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
<ul style="list-style-type: none"> Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? 	
Source: FEMA, July 2008.	

Table D-14 displays the City of Dayton's Mitigation Action Plan matrix listing mitigation actions by hazard and are prioritized within each hazard, not in total. Each mitigation action will be implemented and administered by the applicable managing department, agency, or responsible entity.

***Whenever TBD is used, it means that a benefit/cost analysis will be completed as a project is developed to validate the most appropriate mitigation action.*

Table D-14. City of Dayton Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Natural Hazards						
Multi-Hazard (MH)						
MH	Continue to enforce building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.	Planning and Building	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Continue to restrict manufactured home location in flood hazard areas (require on foundation & elevated above floodplain)	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Cross-reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	City Admin/Planning	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.	City Admin/Planning	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	Public Works	Ongoing	General Fund, HSGP, HMGP	BC: TBD** TF: Yes	

Table D-14. City of Dayton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
MH	Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.	Engineering	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
<i>Flood</i>						
Flood	Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Flood	Develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Flood	Develop, implement, and enforce floodplain management ordinances.	City Admin	Ongoing	General Fund, HMA	BC: TBD** TF: Yes	
Flood	Acquire, relocate, elevate, or otherwise flood-proof identified properties.	City Admin	Ongoing	General Fund, HMGP, HMA, NRCS	BC: TBD** TF: Yes	
Flood	Inventory culverts in need of modification to increase culvert size to increase its drainage efficiency.	Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Flood	Construct floodwalls around the perimeter of a "facility" and extending above the highest flood elevation to keep floodwaters away from the facility. Floodwalls can be made from gabion baskets, concrete, large riprap, etc. Floodwalls should be used with caution as they can also act as a catchment preventing drainage away from the facility.	Public Works	Ongoing	General Fund, HMGP, HMA, FHWA,	BC: TBD** TF: Yes	

Table D-14. City of Dayton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Flood	Change under-bridge utility location to under-river	Public Works/Utility Companies	Ongoing	General Fund, FHWA, HMA, Utility Company	BC: TBD** TF: Yes	
Flood	Construct concrete wing walls at culvert or bridge entrances and outlets to direct water flow into their openings	Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
Flood	Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.	Planning	Ongoing	General Fund	BC: TBD** TF: Yes	
Winter Storm						
Winter Storm	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.	City Admin/	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
Winter Storm	Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.	City Admin/Public Works	Ongoing	General Fund, HSGP, HMGP, HMA	BC: TBD** TF: Yes	
Winter Storm	Continue tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.	City Admin/Public Works	Ongoing	General Fund, FMAP, HMGP, HMA	BC: TBD** TF: Yes	

Table D-14. City of Dayton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Winter Storm	Maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages in new development from severe winter storms. Consider developing incentive programs.	Public Works	Ongoing	General Funds, Utility Co	BC: TBD** TF: Yes	
Winter Storm	Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests.	City Admin/NOAA/ NWS/ Radio Broadcasters	Ongoing	General Fund, NOAA/ NWS	BC: TBD** TF: Yes	
Winter Storm	Implement and enforce the most current Uniform State Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Winter Storm	Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.	Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
<i>Landslide</i>						
Landslide	Complete a landslide location inventory; identify threatened critical facilities and other buildings and infrastructure.	Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
<i>Wildland Fire</i>						
Wildland Fire	Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.	City Admin/Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	
<i>Earthquake (EQ)</i>						
EQ	Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.	Building	Ongoing	General Fund	BC: TBD** TF: Yes	

Table D-14. City of Dayton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
EQ	Maintain a wood-frame residential building inventory and an outreach program to educate population concerning facilities particularly vulnerable to earthquake damage, such as pre-1940s homes and homes with cripple wall foundations.	City Admin/Public Works	Ongoing	General Fund, HMGP, NEHRP	BC: TBD** TF: Yes	
EQ	Update existing (or adopt the most current) Uniform Building Code	City Council	Ongoing	General Fund	BC: TBD** TF: Yes	
EQ	Implement and enforce the Uniform Building Codes.	Building Department	Ongoing	General Fund	BC: TBD** TF: Yes	
EQ	Inspect and/or certify all new construction.	Building Department	Ongoing	General Fund	BC: TBD** TF: Yes	
EQ	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.	Engineering	Ongoing	General Fund, HMGP, NEHRP	BC: TBD** TF: Yes	
EQ	Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.	City Admin.	Ongoing	General Fund, HMGP, NEHRP	BC: TBD** TF: Yes	
Volcano						
Volcano	Update public emergency notification procedures and develop an outreach program for ash fall events.	City Admin/Public Works/Fire & Police Dept	Ongoing	General Fund, NOAA/ NWS	BC: TBD** TF: Yes	
Wind						
Wind	Review ordinances and develop outreach programs to assure manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	

Table D-14. City of Dayton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Wind	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.	City Admin/Public Works	Ongoing	General Fund, HSGP, HMGP, HMA	BC: TBD** TF: Yes	
Wind	Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.	City Admin/Public Works	Ongoing	General Fund, Utility Co	BC: TBD** TF: Yes	
Erosion						
Erosion	Continue to regulate development in erosion prone areas	Planning	Ongoing	General Fund	BC: TBD** TF: Yes	
Erosion	Continue outreach program to educate the public concerning planting processes and materials used to stabilize hill slopes or stream banks. This is known as bio-engineering; which uses logs, root wads, or wood debris or other vegetation to reduce scour and erosion. (Partnership with watershed council)	City Admin/Public Works	Ongoing	General Fund, NRCS, HMGP	BC: TBD** TF: Yes	
Erosion	Maintain erosion protection by city park at city sewer outfall header	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
Erosion	Coordinate with Yamhill County to protect county park boat landing	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	

Table D-14. City of Dayton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Technological and Manmade Hazards						
<i>Disruption of Utility and Transport Systems (DUTS)</i>						
DUTS	Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.	City Admin	Ongoing	General Fund, HSGP, HMGP, ER&S	BC: TBD** TF: Yes	
DUTS	Purchase backup power systems for all identified critical facilities.	Public Works	Ongoing	General Fund, HSGP, IECCP	BC: TBD** TF: Yes	
<i>Hazardous Materials (HAZMAT)</i>						
HAZMAT	Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.	City Admin/Public Works/Fire & Police Dept	Ongoing	General Funds, HSGP, EPA, SARA, CERCLA, CTGP	BC: TBD** TF: Yes	In Place
HAZMAT	Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.	Public Works	Ongoing	General Funds, HSGP, EPA, SARA, CERCLA, CTGP	BC: TBD** TF: Yes	In Place
HAZMAT	Evaluate existing security measures for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS) and enhance security as necessary.	City Admin/Public Works/Fire & Police Dept	Ongoing	General Funds, HSGP	BC: TBD** TF: Yes	In Place

Table D-14. City of Dayton Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
HAZMAT	Evaluate seismic bracing/anchoring for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS). (Propane, not bulk fuel)	City Admin/Public Works/Fire & Police Dept	Ongoing	General Funds, HMGP, HMA, HSGP,	BC: TBD** TF: Yes	
HAZMAT	Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.	Code Compliance	Ongoing	General Funds, HSGP, EPA, SARA, CERCLA, CTGP	BC: TBD** TF: Yes	
HAZMAT	Research, develop, and implement methods to protect waterways from hazardous materials events.	Public Works	Ongoing	General Funds, HSGP, EPA, SARA, CERCLA, CTGP	BC: TBD** TF: Yes	
HAZMAT	Prepare a site-specific summary of hazardous materials used and stored in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.	Public Works	Ongoing	General Funds, HSGP, EPA, SARA, CERCLA, CTGP	BC: TBD** TF: Yes	

Appendix E

City of Dundee

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This appendix contains information about the City of Dundee to support the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section discusses the City of Dundee's planning process by listing Steering Committee membership, documenting public outreach efforts, and summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process. Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The City of Dundee is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill the goal, the City organized a MHMP development Steering Committee dedicated to identifying hazard threats and developing actions to mitigate damage and life losses from those threats.

Table E-1 contains the City of Dundee's Steering Committee participant list to augment the Yamhill County MHMP planning elements.

Table E-1. City of Dundee Steering Committee	
Name	Agency/Department/Affiliation
Rob Daykin	City Administrator
Al Mustain	Superintendent of Public Works
John Stock	Fire Chief

Table E-2 contains the summary of the City of Dundee's public involvement and planning meeting activities.

Table E-2. City of Dundee Public Involvement Mechanisms	
Mechanism	Description
Newsletter Distribution	Distributed with water utility bill on July 7, 2008 to introduce the project and request public input
Public Meeting	Two meetings held August 15 and 18, 2008 to present draft risk assessment and request public input

CAPABILITY ASSESSMENT

Table E-3, E-4, and E-5 contain the City's resources used to support planning activities.

Table E-3. City of Dundee Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Comprehensive Plan	Revised several times (1977), latest revision 2003
	Waste Water Facility Plan	2008; revising Master Plan-significant improvements in the next 3 years, in the process of upgrading Wastewater Plant-new treatment facility
	Water Master Plan	Sept 2003; focuses on upgrading water sources, new studies will be completed shortly, looking at potential new treatment facility for use river water as a source; city has a surface water right at this time,
	Transportation System Plan	2003
	Street Maintenance Master Plan	Adopted 2008
	Stormwater Runoff Mitigation Plan-In Process of putting mitigation plan together	State Department of Environmental Quality-minimum daily limits. Stormwater discharge entering the Willamette River basin, including bacteria, temperature, and mercury-implementation plan may lead to changes in the development code
	Stormwater Drainage Facility Plan	Adopted 2006
	Public Works Standard	Applies to all improvements within existing and proposed public ROW and to all improvements requiring approval under the development code.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and execution of plans for the protection of persons and property within the County in the event of an emergency.
	Title 8.70 Hazardous Materials Releases	Provides procedure for coordination among various agencies in the event of hazardous materials releases.
	Dundee Municipal Code	A codification of general ordinances; current through June 24, 2008. Guides City governance, development, and public safety and health; guides coordinated development for efficiency and health and safety of the City.
	Fire Dept Evaluations	Facilities, equipment, and staffing levels reviewed; 2006

Table E-3. City of Dundee Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Effect on Hazard Mitigation
	Seismic Study on Public Buildings	Completed by the State of Oregon
	Floodway Regulations	<p>15.04 and 15.12 of Dundee Municipal Code</p> <p>15.04.020 The purpose of this code is to establish uniform performance standards providing reasonable safeguards for health, welfare, comfort and security of the residents of this jurisdiction who are occupants and users of buildings and for the use of modern methods, devices, materials, techniques and practicable maximum energy conservation. [Ord. 339 § 2, 1996]</p> <p>15.12 of Dundee Municipal Code: Guides building, health & safety, and mitigation measures for the City.</p>

Table E-4. City of Dundee Administrative and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Contract with City of Newberg Planning Dept; Contract with Wallace Engineering to review land use applications and subdivision plans
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Contract-Building Inspector-Gary Biggs
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Contract - Wallace Engineering and development plans filter through Fire, Public Works and Planning Dept
Floodplain manager	Planning Commission administers Floodway Regulations
Personnel skilled in GIS and/or HAZUS-MH	None
Director of Emergency Services	John Stock-Fire Chief; Police Chief-Brian Casey
Finance (grant writers, purchasing)	No grant writers, part-time employee for payroll-Cheryl Hartman
Public Information Officers	Rob Daykin; or if Fire Related-John Stock

Table E-5. City of Dundee Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	Yes
Authority to levy taxes for specific purposes	Yes, with vote of people
Incur debt through general obligation bonds	Yes, with vote of people
Incur debt through special tax and revenue bonds	Yes, can be forced to a vote
Incur debt through private activity bonds	No
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which is available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate and protect repetitively flooded structures and infrastructure.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards	
Identifying Hazards	
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.	
Element	
■ Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	
Source: FEMA, July 2008.	

The City of Dundee’s Steering Committee determined the following hazards could potentially threaten the community. Those hazards identified with an (*) are newly identified by the county as part of the update process – those identified with an (x) are specific to the City of Dundee.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	X
Wind	X
Erosion*	X
ENSO (El Niño / La Niña)*	
Expansive Soils*	
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	
Infectious Disease Epidemic*	

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for the City of Dundee to augment the MHMP development process. It includes:

- Identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment]must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

The City of Dundee actively participates in FEMA's National Flood Insurance Program (NFIP) and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS: SPECIFIC STEPS

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets within each community that may be affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the City's existing building and infrastructure assets and insured values and are identified in detail in Tables E-6A, E-6B, and E-7.

Tables E-8, E-9, and E-10 portray the City's critical infrastructure numbers and values, and their potential vulnerability by hazard type.

The City of Dundee seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table E-6A were obtained from the 2000 U.S. Census and Portland State University. It comprises census block level data, and estimates from university conducted community research.

The City's existing building and infrastructure and insured values are identified in Tables E-6A, E-6B, and E-7.

Table E-6A. City of Dundee Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census³	Total Building Count	Total Value of Buildings (\$)¹
2,598	2,965	3,040	1,004	195,480,082 ²

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$153,000 per structure).

² Yamhill county Taxing Districts: http://www.co.yamhill.or.us/assessor/Documents/2007_Taxing_Districts.pdf

³ Portland State University (PSU) 2007 Oregon Population Report.

Table E-6B. City of Dundee NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties²
Dundee	965	0	3	980,000	321.67	3	17,679	0

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

²Content and building claims.

(Note – many critical facilities and locations have been identified and included in this inventory and risk assessment – due to their confidential nature, their locations have been “shaded” for publication. The data will remain in the report for the County’s future mitigation planning efforts)

Table E-7. City of Dundee Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Government	City Hall and Administrative Offices	620 SW 5th St.	\$500,000
	Dept of Public Works (shop and Fire Dept on same parcel)	791 N Hwy 99W	\$400,000
	City of Dundee Assets		\$1,360,855
Emergency Response	Fire Station	759 N Hwy 99W	\$1,200,000
	Police Department (Newberg)	401 E. 3rd St., Newberg	Unknown
Educational	Children’s Music Station (private church school)	1110 N. Highway 99 W	Unknown
	Dundee Elementary School (K-5)	140 SW 5th St.	\$2,430,197.00
	Bonnie Benedict Preschool	502 E. 2nd St., Newberg	Unknown
Community	Dundee Women’s Center	1026 Highway 99W	Unknown
	Dundee Pioneer Cemetery	NW Viewmont Drive	Unknown
	United Methodist Church	11th St. & N Highway 99W	\$310,609.00
	Promise Church	1802 Haworth Ave., Newberg	\$135,215.00
	Chehalem Park District 18 parks	1802 Haworth A, Newberg	Unknown
	Crabtree Park	see Coordinates	Unknown
	Dundee/Billick Park	see Coordinates	Unknown
	Dundee Scenic Overlook	see Coordinates	Unknown
	Falcon Crest Park	see Coordinates	Unknown
Highways	State Hwy 99W (2 lanes with center turn lane)-with curbs	1 mile	\$385,000
Railroads	Pacific Willamette Railroad-runs through town	1 mile	Unknown
Utilities	Verizon Switching Facility		Unknown
	9 potable water wells and lift stations		Unknown
Utilities	Reservoir, concrete, 1973 (400,000-gallon capacity)		\$501,000
	Reservoir, steel, 1973 (200,000-gallon capacity)		\$197,000
	Reservoir, steel, 1973 (50,000-gallon capacity)		\$94,000
	Lift station and Wastewater Treatment plant		\$1,300,000
	Fiber Optic Route through town that goes to Asia		1 mile
	Water Wells # 1,2,7 & 8 with lift station/clear well reservoir-		\$300,000
	Water Well #5		\$63,000
	Water Well #9		\$113,000
	Water Well #10		\$63,000

Table E-7. City of Dundee Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	Verizon		Unknown
	Comcast Cable Television		Unknown
	Regional Landfill - near McMinnville (17 miles from Dundee)		Unknown

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is discussed in the Yamhill County MHMP, Section 6. The following Hazard Exposure Analysis Overviews, Tables E-8, E-9, and E-10, were developed by the City of Dundee's Steering Committee. The results are also depicted in the figures located in Appendix K.

Table E-8. City of Dundee Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$) ¹	Number	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	26	3,978,000	--	--
	High	100-year floodplain	--	26	3,978,000	--	--
Winter Storm		descriptive	3,040	1,004	195,480,082	9	unknown
Landslide	Moderate	14-32 degrees	--	532	81,396,000	5	unknown
	High	>32 degrees	--	152	23,256,000	0	--
Wildland Fire	Moderate	Moderate fuel rank	--	975	149,175,000	9	unknown
	High	High fuel rank	--	921	140,913,000	9	unknown
	Very High	Very high fuel rank	--	283	43,299,000	1	unknown
	Extreme	Extreme fuel rank	--	1	153,000	0	--
Earthquake	Strong	9-20% (g)	--	1,004	195,480,082	9	unknown
	Very strong	>20-40% (g)	--	0	--	0	--
	Severe	>40-60% (g)	--	0	--	0	--
Volcano		descriptive	3,040	1,004	195,480,082	9	unknown
Wind		descriptive	3,040	1,004	195,480,082	9	unknown
Erosion			--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	3,040	--	--	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	622	95,166,000	9	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$153,000 per structure). Note-population by parcel was not available at the time this document was prepared. 0.25 mile-buffered EHS sites were not able to be calculated due to the use of census block level data. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed.

Table E-9. City of Dundee Potential Hazard Exposure Analysis Overview-Critical Facilities												
			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--	--	--
	High	100-year floodplain	1	400K	--	--	1	unknown	--	--	--	--
Winter Storm		descriptive	2	2.3M	2	1.2M	3	2.4M	--	--	9	446K
Landslide	Moderate	14-32 degrees	2	2.3M	--	--	1	unknown	--	--	6	135K
	High	>32 degrees	1	400K	--	--	1	unknown	--	--	1	unknown
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	--	--	--	--	--	--
	High	High fuel rank	2	2.3M	2	1.2M	2	unknown	--	--	9	446K
	Very High	Very high fuel rank	1	400K	--	--	1	2.4M	--	--	3	unknown
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	2	2.3M	2	1.2M	3	2.4M	--	--	9	446K
Wind		descriptive	2	2.3M	2	1.2M	3	2.4M	--	--	9	446K
Erosion		300' buffer	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	2	2.3M	2	1.2M	3	2.4M	--	--	9	446K
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	2	2.3M	2	1.2M	3	2.4M	--	--	6	446K
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	1	500K	2	1.2M	2	2.4M	--	--	5	310K

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Table E-10. City of Dundee Potential Hazard Exposure Analysis Overview-Critical Infrastructure														
			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)¹	Miles	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--	--	--	--	--
	High	100-year floodplain	--	--	--	--	--	--	--	--	1	unknown	--	--
Winter Storm		descriptive	1	385K	1	unknown	--	--	--	--	14	2.6M	--	--
Landslide	Moderate	14-32 degrees	--	--	--	--	--	--	--	--	5	997K	--	--
	High	>32 degrees	--	--	--	--	--	--	--	--	1	300K	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
	High	High fuel rank	--	--	--	--	--	--	--	--	8	1.1M	--	--
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	1	300K	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	1	300K	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	1	385K	1	unknown	--	--	--	--	14	2.6M	--	--
Wind		descriptive	1	385K	1	unknown	--	--	--	--	14	2.6M	--	--
Erosion		300' buffer	--	--	--	--	--	--	--	--	1	250K	--	--
Disruption of Utility and Transportation Systems		descriptive	1	385K	1	unknown	--	--	--	--	14	2.6M	--	--
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	--	--	--	--	--	--	--	6	270K	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--	--	--	--	4	176K	--	--

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SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section describes each hazard and the community's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

The hazard vulnerability and impact summary is derived from the best available data for facility locations and values. In many cases, values were unavailable; therefore, the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA Flood Insurance Rate Maps (FIRMs) were used to outline the 100-year and 500-year floodplains for the City of Dundee. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In the City of Dundee, 26 residential structures (value \$3.97M), one government facility (value \$400K), one educational facility (value unknown), and one utility (value unknown) are located within the boundaries of the 100-year floodplain.

There are 26 residential structures (value \$3.97M) with no critical facilities within the 500-year floodplain.

Winter Storm

Ice, cold, high winds, and floods from winter storms have widespread impacts. Damage to facilities and infrastructure can be severe, depending on the intensity of the storm event.

Since winter storms are regional events, the entire City of Dundee can be affected. Therefore all 3,040 residents, 1,004 residential structures (value \$195.5M), nine non-residential facilities (value unknown), two government facilities (value \$2.3M), two emergency response facilities (value \$1.2M), three educational facilities (value \$2.4M), nine community facilities (446K), one highway and rail segment (value \$385K), and 14 utilities (value \$2.6M) are at risk.

Landslide

The potential impacts from landslides can be widespread. Debris flows and landslides can impact transportation and rail routes, utility systems, and water and wastewater treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts vary from minor cleanup to more extensive utility system reconstruction. Utility disruptions are usually local and terrain dependent, and sometimes require reestablishing electrical power, communication, and gas pipeline connections at breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and wastewater may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability at the water and wastewater treatment plants.

U.S. Geologic Survey (USGS) elevation datasets were used to determine the landslide hazard areas within the City of Dundee. Risk was assigned based on slope angle. A slope angle less

than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, the City of Dundee has 532 residential structures (value \$81.4M), five non-residential structures (value unknown), two government facilities (value \$900K), one educational facility (value unknown), six community facilities (value \$135K), and five utilities (value \$977K) located in areas of moderate risk.

There are 152 residential structures (value \$23.3M), one government facility (value \$400K), one community facility (value unknown), one educational facility (value unknown), and one utility (value \$300K) located within an area of high risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

The City of Dundee has critical facilities and infrastructure located within areas with moderate, high, very high, and extreme fuel ranks. Moderate fuel rank areas contain 975 residential structures (value \$149.2M), nine non-residential structures (value unknown), two government facilities (value \$900K), two emergency response facilities (value \$1.2M), three educational facilities (value \$2.4M), nine community facilities (value \$446K), and nine utilities (value \$2.1M).

High fuel rank areas contain 921 residential structures (value \$140.9), nine non-residential structures (value unknown), two government facilities (value \$900K), two emergency response facilities (value \$1.2M), two educational facilities (value unknown), nine community facilities (value \$446K), and eight utilities (value \$1.1M).

Very high fuel rank areas contain 283 residential structures (value \$43.3M), one non-residential structure (value unknown), one government facility (value \$400K), one educational facility (value \$2.4M), three community facilities (value unknown), and one utility (value \$300K).

Extreme fuel rank areas contain one residential structures (value \$153K) and one utility (value \$300K).

Earthquake

Based on Peak Ground Acceleration (PGA) shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion because of its proximity to the Cascadia Subduction Zone. Ground movement in both areas is likely to cause damage to weak, unreinforced masonry buildings, and to induce landslides along unstable slopes. Earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The City of Dundee is in the eastern portion of Yamhill County in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak

acceleration of the ground caused by the earthquake, and for a strong designation corresponds to nine to twenty percent of the acceleration of gravity.

Since earthquakes are regional events, the entire City of Dundee can be affected. Therefore all 3,040 residents, 1,004 residential structures (value \$195.5M), nine non-residential facilities (value unknown), two government facilities (value \$2.3M), two emergency response facilities (value \$1.2M), three educational facilities (value \$2.4M), nine community facilities (446K), one highway and rail segment (value \$385K), and 14 utilities (value \$2.6M) are at risk.

Volcano

Ashfall or tephra are the most likely forms of volcanic activity to impact Yamhill County and the City of Dundee. Damage is likely to result from volcanic eruption columns and clouds containing volcanic gases, minerals, and rock. The columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat, and can distribute acid rain as sulfur dioxide gas mixes with water. Additionally, these particles can create a risk of suffocation. Carbon dioxide is heavier than air and collects in valleys and depressions, threatening humans and animals. Fluorine clings to ash particles and can pose a toxic threat potentially poisoning grazing livestock and contaminating domestic water supplies.

However, due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability. All 3,040 residents, 1,004 residential structures (value \$195.5M), nine non-residential facilities (value unknown), two government facilities (value \$2.3M), two emergency response facilities (value \$1.2M), three educational facilities (value \$2.4M), nine community facilities (446K), one highway and rail segment (value \$385K), and 14 utilities (value \$2.6M) are equally at risk.

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Dundee are equally at risk of a windstorm event. Therefore all 3,040 residents, 1,004 residential structures (value \$195.5M), nine non-residential facilities (value unknown), two government facilities (value \$2.3M), two emergency response facilities (value \$1.2M), three educational facilities (value \$2.4M), nine community facilities (446K), one highway and rail segment (value \$385K), and 14 utilities (value \$2.6M) are at risk.

Erosion

Riverine erosion rarely causes death or injury. However, erosion causes significant destruction of property, development, and infrastructure. Erosion hazard data is not readily available; however, descriptions of several localized areas were identified by location on a map referencing the river or stream reach described. Critical facilities at risk of erosion were identified using a 300 foot-buffer in the areas identified as having historic erosion impacts to conservatively account for building footprints.

The City of Dundee identified the wastewater outfall (value \$250K) as at risk from erosion impacts.

Disruption of Utility and Transportation Systems

Transportation system disruption impacts range from effects on life, health, and safety to economic effects from delays, lost commerce, and lost time. Emergency vehicle mobility and access to hospitals, evacuation routes, and vital supplies can be affected if transport is seriously disrupted for an extended period. Similarly, disruption of utility systems can affect commerce, recreation, and fundamental health and safety in Yamhill County and the City of Dundee. Countywide and citywide disruptions are likely to impact all residents equally. Structural damage from disruptions to these systems is not expected; rather the risks apply equally to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the U.S. Environmental Protection Agency's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses generating hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and all facilities within a 0.25 miles radius of those and EHS facilities are considered at risk.

There are 622 residential structures (value \$95.2M), nine non-residential structures (value unknown), two government facilities (value \$900K), two emergency response facilities (value \$1.2M), three educational facilities (value \$2.4M), six community facilities (value \$446K), and six utilities (value \$270K) considered at risk.

The City of Dundee has one government facility (value \$500K), two emergency response facilities (value \$1.2M), two educational facilities (value \$2.4M), five community facilities (value \$310K), and four utilities (value \$176K) located within the 0.25 mile-buffered EHS zone.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County's mitigation goals listed in Table E-11, or to revise them to more fully meet the City of Dundee's needs. The committee proceeded to evaluate potential mitigation actions after finalizing the mitigation goals. Mitigation actions are activities, measures, or projects used to help achieve the goals of a mitigation plan. Table E-12 shows the Dundee's considered mitigation actions developed during this mitigation planning process. The revised list in Table E-14 delineates those actions the City will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

The City of Dundee actively participates in FEMA's National Flood Insurance Program (NFIP) and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City of Dundee's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing RL properties to assure an effective flood mitigation program.

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table E-11. 2006 Yamhill County Mitigation Goals-Considered	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

Table E-12. City of Dundee Mitigation Actions Considered			
Hazard	Status	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
MH	<i>Ongoing</i>	In-place	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>	In-place	Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)
MH	<i>Ongoing</i>	In-place	Review ordinances and develop outreach programs to assure fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.
MH	<i>Ongoing</i>	In-place	Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	<i>Ongoing</i>	In-place	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	Consider		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	<i>Ongoing</i>	In-place	Install lightening rods and lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.
MH	<i>Ongoing</i>		Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
MH	<i>Ongoing</i>	In-place	Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.
MH	<i>Ongoing</i>	In-place	Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
MH	<i>Ongoing</i>	In-place	Acquire, demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.
MH	Consider		Establish a formal role for the jurisdictional Hazard Mitigation Planning Committees to develop a sustainable process to implement, monitor, and evaluate citywide mitigation actions.
MH	Consider		Identify and pursue funding opportunities to implement mitigation actions.
MH	Consider		Integrate the Mitigation Plan findings into planning and regulatory documents and programs and into enhanced emergency planning.
Flood			
Flood	<i>Ongoing</i>		Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.

Table E-12. City of Dundee Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	<i>Ongoing</i>		Develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.
Flood	<i>Ongoing</i>		Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current USACOE flood data.
Flood	<i>Ongoing</i>		Request DOGAMI debris flow and lahar data be included in FIRM updates. Use the updated FIRMS for land use and mitigation planning.
Flood	Consider		Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
Flood	<i>Ongoing</i>	In place	Develop, implement, and enforce floodplain management ordinances.
Flood	<i>Ongoing</i>	In place	Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	Consider		Construct earthen berms to divert flood flows into bridge or culvert openings. The earth fill should be erosion-resistant and the berms should be covered with erosion-resistant fabric, armoring materials, or vegetation.
Flood	<i>Ongoing</i>	In place	Increase culvert size to increase its drainage efficiency.
Flood	<i>Ongoing</i>	In place	Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
Flood	<i>Ongoing</i>	In place	Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
Flood	<i>Ongoing</i>		Construct debris deflectors to deflect the major portion of debris away from culvert entrances and bridge piers. They are normally "V" shaped.
Flood	<i>Ongoing</i>		Install debris fins upstream of a culvert to align debris so that the debris will pass through a drainage opening without clogging the inlet. They are sometimes used on bridge piers to deflect drifting materials.
Flood	<i>Ongoing</i>	In place	Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.
Flood	<i>Ongoing</i>	In place	Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
Winter Storm			
Winter Storm	<i>Ongoing</i>	In place	Develop and implement strategies and educational outreach programs for debris management from severe winter storms.
Winter Storm	<i>Ongoing</i>		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
Winter Storm	Consider		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	Consider		Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.
Winter Storm	<i>Ongoing</i>	Utility has preventative ops	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.

Table E-12. City of Dundee Mitigation Actions Considered

Hazard	Status	Comment	Description
Winter Storm	<i>Ongoing</i>		Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
Winter Storm	<i>Ongoing</i>	In place	Purchase NOAA Weather radios and develop a web portal linking residents to various weather information sites. (NWS, FEMA, The Weather Channel).
Winter Storm	<i>Ongoing</i>	In place	Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter Storm	Consider		Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.
Landslide			
Landslide	<i>Ongoing</i>		Complete a landslide location inventory, identify threatened critical facilities and other buildings and infrastructure.
Landslide	Consider		Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
Landslide	Consider		Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).
Landslide	<i>Ongoing</i>		Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
Landslide	Consider		Develop comprehensive geological landslide and rockslide prone area maps.
Landslide	Consider		Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.
Landslide	<i>Ongoing</i>	In place	Identify and seasonally restrict recreational and construction activities in high landslide areas.
Landslide	<i>Ongoing</i>	In place	Develop, implement and enforce property development landslide risk assessment procedures to identify potential facility vulnerability.
Wildland Fire			
Wildland Fire	<i>Ongoing</i>		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
(Wildland Fire	Consider		Develop emergency operations plan to identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
Wildland Fire	Consider		Develop Community Wildland Fire Protection Plans for all at-risk communities.
Wildland Fire	<i>Ongoing</i>		Provide real-time internet access and interagency cooperation to decrease wildland fire warning times.
Wildland Fire	Consider		Schedule and perform government facility "fire drills" at least twice per year.
Wildland Fire	<i>Ongoing</i>	In place	Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.

Table E-12. City of Dundee Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake			
Earthquake	<i>Ongoing</i>		Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.
Earthquake	Consider		Develop Emergency Operations Plan to address response during seismic events.
Earthquake	Consider		Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Earthquake	Consider		Replace or retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.
Earthquake	<i>Ongoing</i>	In place	Update existing (or adopt the most current) Uniform Building Code
Earthquake	<i>Ongoing</i>	In place	Implement and enforce the Uniform, International, and State Building Codes.
Earthquake	<i>Ongoing</i>	In place	Inspect and/or certify all new construction.
Earthquake	<i>Ongoing</i>	In place	Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.
Earthquake	<i>Ongoing</i>		Develop outreach program to educate population concerning household, business, and public facility mitigation measures. For example, staff public information tables at fairs, safety events, and festivals.
Earthquake	<i>Ongoing</i>		Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
Earthquake	<i>Ongoing</i>		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.
Earthquake	<i>Ongoing</i>	In place	Identify and prioritize a list of critical facilities with unreinforced masonry problems including non-structural projects such as brick chimney bracing or replacement, water heater bracing, and anchoring, etc.
Earthquake	<i>Ongoing</i>	In place	Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.
Earthquake	Consider		Develop outreach program for educating private facilities concerning alternative or emergency power source acquisition to enable them to deliver food, fuel, and medical services during disaster emergency response and recovery efforts.
Earthquake	<i>Ongoing</i>	In place	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Earthquake	Consider		Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.
Volcano			
Volcano	Consider		Address in Emergency Ops Plan public emergency notification procedures and address development of an outreach program for ash fall events.
Volcano	Consider		Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.
Volcano	<i>Ongoing</i>	In place	Evaluate capability of water treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.

Table E-12. City of Dundee Mitigation Actions Considered			
Hazard	Status	Comment	Description
Wind			
Wind	<i>Ongoing</i>	In place	Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)
Wind	<i>Ongoing</i>	In place	Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.
Erosion			
Erosion	Consider		Maintain and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat.
Erosion	Consider		Apply for grants/funds to implement riverbank protection methods.
Erosion	Consider		Develop bioengineering program to restore riverbank to protect from erosion (ie. planting processes and materials used to stabilize hill slopes or stream banks). This is known as bio-engineering; which uses logs, root wads, or wood debris or other vegetation to reduce scour and erosion.
Erosion	<i>Ongoing</i>		Harden culvert entrance bottoms with asphalt, concrete, rock, to reduce erosion or scour.
Erosion	<i>Ongoing</i>		Install embankment protection such as vegetation, riprap, gabion baskets, sheet piling, and walls to reduce or eliminate erosion.
Erosion	<i>Ongoing</i>		Install walls at the end of a drainage structure to prevent embankment erosion at its entrance or outlet. (end walls).
Erosion	Consider		Construct a rock or concrete structure to dissipate energy or reduce flow velocity to prevent erosion of the streambed and banks.
Erosion	Consider		Install flared outlets or end sections at culvert entrances and outlets to match the embankment slope to reduce erosion and scour at the entrance and exit points during high flow.
Erosion	Consider		Install flow diverters a short distance into a water body, tied into the bank, to protect from erosion at their end. Designed to redirect water flow away from embankments.
Erosion	Consider		Install channel lining using pipe, rock, concrete, or asphalt to reduce scouring embankments and ditch bottom erosion.
Erosion	Consider		Install bank revetment protection to prevent erosion.
Disruption of Utility and Transport Systems (DUTS)			
DUTS	Consider		Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.
DUTS	Consider		Develop emergency operations plan for assisting with response to utility disruptions.
DUTS	Consider		Develop emergency operations plan for assisting with response to transportation route disruptions, and acquire additional barricades.
DUTS	Consider		Identify and prioritize all “jurisdiction owned” & “non-jurisdiction owned” critical facilities that have backup power and develop emergency operations plans.
DUTS	Consider		Purchase backup power systems for all identified critical facilities.

Table E-12. City of Dundee Mitigation Actions Considered			
Hazard	Status	Comment	Description
HAZMAT			
HAZMAT	<i>Ongoing</i>	In place	Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.
HAZMAT	Consider		Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.
HAZMAT	Consider		Evaluate existing security measures for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS) and enhance security as necessary.
HAZMAT	<i>Ongoing</i>	In place	Evaluate seismic bracing/anchoring for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS).
HAZMAT	<i>Ongoing</i>		Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.
HAZMAT	<i>Ongoing</i>		Develop outreach program to educate the public regarding chemical hazards, safe handling, storage, and disposal procedures.
HAZMAT	<i>Ongoing</i>		Research, develop, and implement methods to protect waterways from hazardous materials events.
HAZMAT	<i>Ongoing</i>		Prepare a site-specific summary of hazardous materials used, stored, and commonly transported in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met on September 11, 2008 to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. The committee met again on October 30, 2008 to determine the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

To complete this task, the Steering Committee reviewed the simplified STAPLE-E evaluation criteria (shown on the following page) and the Benefit-Cost Analysis Fact Sheet (Appendix P) to consider the opportunities and constraints of implementing each particular mitigation action.

Evaluation Criteria for Mitigation Actions		
Evaluation Category	Discussion “It is important to consider...”	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, State, and Federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, State, and Federal laws

Upon review, the Steering Committee assigned a high priority ranking to actions best fulfilling the goals of the MHMP and are appropriate and feasible for the City of Dundee and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined only the existing and new mitigation actions receiving a high priority ranking would be included in the countywide Mitigation Action Plan. Table B-14 depicts the City of Dundee’s mitigation actions grouped by hazard and in descending priority order within each hazard.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

The City of Dundee Steering Committee reviewed the Yamhill County goals and determined those listed in Table E-13 meet the City's needs. These goals were implemented for the current planning period.

Table E-13. City of Dundee Mitigation Goals	
Goal Number	Goal Description
1	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
2	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
3	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
4	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
<ul style="list-style-type: none"> Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? 	
Source: FEMA, July 2008.	

Table E-14 shows the City of Dundee’s Mitigation Action Plan matrix describing how the mitigation actions were prioritized, the overall benefit-costs were taken into consideration, and each mitigation action will be implemented and administered by the Steering Committee and the applicable responsible entity.

Table E-14. City of Dundee Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Multi-Hazard (MH)						
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	Fire Department	0-2 years	General Fund	BC: TBD TF: Yes	Possibility of obtaining surplus equipment from state or federal agencies.
MH	Identify and pursue funding opportunities to implement mitigation actions.	City Administrator	Annual	General Fund	BC: TBD TF: Yes	Ongoing review of grant opportunities.
Flood						
Flood	Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.	City Administrator	Annual	General Fund, HMA,	BC: TBD TF: Yes	No development currently in flood plains.
Winter Storms						
Winter Storms	Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.	City Administrator	0-2 years	General Fund, HMGP, HMA	BC: TBD TF: Yes	Possibility of obtaining energy efficiency grants.
Landslide						
Landslide	Update the stormwater management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides	City Engineer	0-5 years	Stormwater utility fees, HMGP, HSGP	BC: TBD TF: Yes	Completed a TMDL implementation plan in 2008.

Table E-14. City of Dundee Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Wildland Fire						
Wildland Fire	Develop emergency operations plan to identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.	Fire Department	0-2 years	General Fund, FMAP, HSEP	BC: TBD TF: Yes	Need financial assistance to hire consultant for this project.
Earthquake (EQ)						
EQ	Develop Emergency Operations Plan to address response during seismic events.	Fire Department	0-2 years	General Fund, EMPG, HSGP, RCPGP, EOC,	BC: TBD TF: Yes	Need financial assistance to hire consultant for this project.
EQ	Replace or retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.	City Administrator	5 years	Bond Levy, HMGP, HMA,	BC: TBD TF: Yes	Relocation of City Shops from the Fire Hall site (after completion of sewer plant facilities) will allow construction of new facilities.
Volcano						
Volcano	Address in Emergency Ops Plan public emergency notification procedures and address development of an outreach program for ash fall events.	Fire Department	0-2 years	General Fund, EMPG, HSGP, RCPGP, EOC, IECGP, RCPGP	BC: TBD TF: Yes	Need financial assistance to hire consultant for this project.
Wind						
Wind	Review ordinances and develop outreach programs to assure manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)	Building Official	Annual	General Fund, HMGP, HMA	BC: TBD TF: Yes	City adopted State building codes.

Table E-14. City of Dundee Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Erosion						
Erosion	Replace sewer outfall. Greenway (150' from ordinary low water level) along Willamette River has restricted uses-remain in natural state.	City Administrator	2-3 years	Sewer Fees, HMGP, HMA, HSGP	BC: TBD TF: Yes	
Disruption of Utility and Transport Systems (DUTS)						
DUTS	Purchase backup power systems for all identified critical facilities.	Fire Department	0-2 years	General Fund, HSGP	BC: TBD TF: Yes	Possibility of obtaining surplus equipment from state or federal agencies.
Hazardous Materials (HAZMAT)						
HAZMAT	Research, develop, and implement methods to protect waterways from hazardous materials events.	Public Works Department	0-5 years	Stormwater utility fees, EPA, CERCLA, NRCS	BC: TBD TF: Yes	Completed a TMDL implementation plan in 2008.

Appendix F

City of Lafayette

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Appendix F contains specific information about the City of Lafayette, Oregon to support the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section describes the City of Lafayette's planning process by listing Steering Committee membership, documenting public outreach efforts, summarizing the review process, and incorporating existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process. Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The City of Lafayette is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill the goal, the City organized a Hazard Mitigation Plan (HMP) development Steering Committee dedicated to identifying hazard threats and developing actions to mitigate damage and life losses from those threats.

Table F-1 contains the City's Steering Committee participant list to augment the Yamhill County MHMP planning elements.

Table F-1. City of Lafayette Steering Committee	
Name	Agency/Department/Affiliation
Diane Rinks	City Administrator
Jim Anderson	Public Works Foreman
Don Leard	Mayor
Terry Lucich	Fire Chief

Table F-2 contains the summary of the City's public involvement and planning meeting activities.

Table F-2. City of Lafayette Public Involvement Mechanisms	
Mechanism	Description
Newsletter	Mailed newsletter June 30, 2008 to introduce the project and request public input
Public Meetings	Held August 15 and 18, 2008 to present draft risk assessment and request public input
City Website	Posted Newsletter

CAPABILITY ASSESSMENT

Table F-3, F-4, and F-5 contain the City’s resources used to support planning activities, including the reports and studies reviewed during the update of this MHMP.

Table F-3. City of Lafayette Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Lafayette Comprehensive Plan	The comprehensive plan for Lafayette reflects the need to plan for future growth in order to assure adequate lands for various land use requirements, adequate levels of public service and that hazard areas and significant resources are protected. The plan also conforms with the requirements of the statewide planning program. The City anticipates application of the Plan goals and policies will enable the City to prioritize economic needs, investigate funding sources, and direct growth in a cost-efficient manner.
	Lafayette Water Master Plan	Defines water usage for the City and potential mitigation options.
	Lafayette Structural Report	Defines structure requirements to ensure personal health and safety.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency. Describes known hazards.
	Title 8.70 Hazardous Materials Releases	Provides procedure for coordination among various agencies in the event of hazardous materials releases. Describes known hazards.
	Municipal Code	Guides land-use development and transportation requirements. This code consists of all the regulatory and penal ordinances and certain administrative ordinances of the City of Lafayette, Oregon.
	Lafayette Zone Development Ordinance	This Ordinance is enacted to: <ul style="list-style-type: none"> • Implement the goals and policies of the City of Lafayette Comprehensive Land Use Plan • Provide methods of administering and enforcing the provisions of this Ordinance • Promote the public health, safety, and general welfare of the community
	Lafayette Sign Code	The purpose of this Code is to provide equitable rights, reduce conflicts, promote traffic and pedestrian safety, increase the aesthetic value and economic viability of the city, all by classifying and regulating the location, size, type and number of signs and related matters, in a content-neutral manner.
Policies (Municipal Codes)	Address & Zoning Map	Delineates building zones for development and construction regulation.
	Yamhill Water Supply Analysis Report (4/07)	Identifies issues concerning health and safety and provides guidance for mitigating unfavorable water condition.

Table F-4. City of Lafayette Administrative and Technical Resources for Hazard Mitigation	
Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Contract City Engineer-Westech Contract Planner-Mid-Willamette Valley COG
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Contract-Gary Biggs (State Licensed))
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Contract-Westech
Floodplain Manager	Diane Rinks
Personnel skilled in GIS and/or HAZUS-MH	No
Director of Emergency Services	Diane Rinks
Finance (grant writers, purchasing)	Diane Rinks
Public Information Officers	Diane Rinks

Table F-5. City of Lafayette Financial Resources for Hazard Mitigation	
Financial Resources	Effect on Hazard Mitigation
General funds	Yes-Contingency Funds
Authority to levy taxes for specific purposes	Yes - Only with voter approval
Incur debt through general obligation bonds	Yes- Only with voter approval
Incur debt through special tax and revenue bonds	Yes-City has authority for revenue bonds with limits
Incur debt through private activity bonds	Can incur up to the state limit of debt (cap), based on Charter cannot enter into contract for over 1 million dollars without a vote.
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards

Identifying Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.

Element

- Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?

Source: FEMA, July 2008.

The City of Lafayette's Steering Committee determined the following hazards could potentially threaten the community. Those hazards identified with an (*) were newly identified by the County as part of the update process – those identified with an (x) were identified as occurring in the City of Lafayette.

Natural Hazards	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	X
Wind	X
Erosion*	
ENSO (El Niño / La Niña)*	
Expansive Soils*	
Drought	
Technological Hazards	
Dam Failure*	
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	
Infectious Disease Epidemic*	

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for the City of Lafayette to augment the MHMP development process. It comprises:

- Identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

The City of Lafayette actively participates in FEMA's National Flood Insurance Program (NFIP) and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS

Asset Inventory

The asset inventory delineates each community's existing building and infrastructure assets and insured values and are identified in detail in Table F-7.

Tables F-8, F-9, and F-10 portray the critical infrastructure numbers and values, and their potential vulnerability by hazard type.

The City of Lafayette seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table F-6A were obtained from the 2000 U.S. Census and Portland State University. It contains census block level data and estimates from university conducted community research.

The City's existing building and infrastructure and insured values are identified in Tables F-6A, F-6B, and F-7.

Table-6A. City of Lafayette Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census³	Total Building Count²	Total Value of Buildings (\$)¹
2,586	3,105	3,730	1200	123,960,000

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$125,400 per structure).

² City of Lafayette Utility Building Records

³ Portland State University (PSU) 2007 Oregon Population Report.

Table F-6B. City of Lafayette NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties¹
Lafayette	294	0	1	210,000	294.00	0	0	0

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

¹Content and building claims.

(Note – many critical facilities and locations have been identified and included in this inventory and risk assessment – due to their confidential nature, their locations have been “shaded” for publication. The data will remain in the report for the County’s future mitigation planning efforts)

Table F-7. City of Lafayette Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Government and Emergency Response	Lafayette City Hall/ Fire Station/ Court	486 3rd St.	\$1,800,000
	Public Works Shops	260 S. Madison St.	\$300,000
Educational	Little Learners Preschool	344 3rd St.	\$750,000
	Wascher Elementary School	986 7th St Ext.	\$12,000,000
Community	Joel Perkins Park	451 E. 8 th St.	\$100,000
	Commons Park	133 Adams St	\$80,000
	Terry Park	S. Madison St.	\$30,000
	Highlands Park	1015 E. 15 th St.	\$70,000
	Lafayette Community Church	365 3rd St.	\$700,000
	Bible Baptist Church of Lafayette	514 Market St.	\$400,000
	Lafayette Community Center	133 Adams St.	\$100,000
	Yamhill County Historical Museum	605 and 657 Market St.	\$350,000
State and Federal Highways	State Highway 99W	Through town-east to west	1.5 miles; 2 lanes blacktop with curbs
Railroads	Willamette & Pacific Railroad	Through town-east to west	1.5 miles
Bridges	None in City Limits- Access to town provided by Yamhill County Bridge on Lafayette Hwy		\$4,146,000
Transportation Facilities	Lafayette Airstrip		N/A
Utilities	Well #4		\$500,000
	Water Treatment Plant including 4 wells and 3 springs		\$2,000,000
	Wastewater Treatment Plant		\$7,000,000
	4 Lift Stations		\$2,000,000
	City Park Well		\$500,000
	Water Tank (500,000 gal)		\$1,000,000
	Water Distribution System		\$6,600,000
	Sewage Collection System		\$8,700,000

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is discussed in the Yamhill County MHMP Section 6. The following Hazard Exposure Analysis Overviews, Tables F-8, F-9, and F-10, were developed by the City of Lafayette Steering Committee. The results are also depicted in the figures located in Appendix K.

Table F-8. City of Lafayette Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population Number	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$)¹	Number	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--²	--	1	800,000
	High	100-year floodplain	--	--²	--	0	--
Winter Storm		descriptive	3,730	1,200	123,960,000	50	Unknown
Landslide	Moderate	14-32 degrees	150	500	62,700,000	0	--
	High	>32 degrees	--	0	--	0	--
Wildland Fire	Moderate	Moderate fuel rank	--	--²	--	1	300,000
	High	High fuel rank	--	--²	--	0	--
	Very High	Very high fuel rank	--	--²	--	0	--
	Extreme	Extreme fuel rank	--	--²	--	0	--
Earthquake	Strong	9-20% (g)	3,730	1,200	123,960,000	50	Unknown
	Very strong	>20-40% (g)	0	0	--	0	--
	Severe	>40-60% (g)	0	0	--	0	--
Volcano		descriptive	3,730	1,200	123,960,000	50	Unknown
Wind		descriptive	3,730	1,200	123,960,000	50	Unknown
Disruption of Utility and Transportation Systems		descriptive	3,730	1,200	123,960,000	50	Unknown
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	450	141	\$17,681,400	50	Unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$125,400 per structure). Note-population by parcel was not available at the time this document was prepared. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed. 0.25-mile buffered EHS sites were calculated due to the use of census block level data.

² The City of Lafayette Steering Committee elected to not use the census block-level data for analysis of residential structures in flood and wildland fire hazard areas.

Table F-9. City of Lafayette Potential Hazard Exposure Analysis Overview-Critical Facilities												
			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	1	300K	--	--	--	--	--	--	--	--
	High	100-year floodplain	1	300K	--	--	--	--	--	--	1	30K
Winter Storm		descriptive	2	2.1M	1	unknown	2	13M	--	--	9	2.2M
Landslide	Moderate	14-32 degrees	1	300K	--	--	1	12M	--	--	8	1.8M
	High	>32 degrees	--	--	--	--	--	--	--	--	1	100K
Wildland Fire	Moderate	Moderate fuel rank	2	2.1M	1	unknown	2	12.7M	--	--	9	2.2M
	High	High fuel rank	2	2.1M	1	unknown	2	12.7M	--	--	9	2.2M
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	2	2.1M	1	unknown	2	13M	--	--	9	2.2M
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	2	2.1M	1	unknown	2	13M	--	--	9	2.2M
Wind		descriptive	2	2.1M	1	unknown	2	13M	--	--	9	2.2M
Disruption of Utility and Transportation Systems		descriptive	2	2.1M	1	unknown	2	13M	--	--	9	2.2M
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	2	2.1M	1	unknown	2	13M	--	--	8	2.1M
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	2	2.1M	1	unknown	1	750K	--	--	8	2.1M

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Table F-10. City of Lafayette Potential Hazard Exposure Analysis Overview-Critical Infrastructure														
			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)¹	Miles	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	1	4.2M	--	--	2	9M	--	--
	High	100-year floodplain	--	--	--	--	1	4.2M	--	--	2	9M	--	--
Winter Storm		descriptive	1.5	unknown	1.5	unknown	1	4.2M	1	unknown	8	29M	--	--
Landslide	Moderate	14-32 degrees	--	--	--	--	1	4.2M	--	--	6	15.5M	--	--
	High	>32 degrees	--	--	--	--	--	--	--	--	3	4.5M	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	1	4.2M	1	unknown	8	18.5M	--	--
	High	High fuel rank	--	--	--	--	1	4.2M	1	unknown	8	18.5M	--	--
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	1	2M	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	1.5	unknown	1.5	unknown	1	4.2M	1	unknown	8	29M	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	1.5	unknown	1.5	unknown	1	4.2M	1	unknown	8	29M	--	--
Wind		descriptive	1.5	unknown	1.5	unknown	1	4.2M	1	unknown	8	29M	--	--
Disruption of Utility and Transportation Systems		descriptive	1.5	unknown	1.5	unknown	1	4.2M	1	unknown	8	29M	--	--
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	--	--	--	1	4.2M	1	unknown	2	15.5M	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--	--	--	--	8	18.5M	--	--

1 – estimated insured values

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SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section describes each hazard and the community's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for the City of Lafayette. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In the City of Lafayette, one government facility (worth \$300K), one community facility (worth \$30K), one bridge (worth \$4.1M), and two utilities (worth \$9M) are located in the 100-year floodplain and therefore accorded a high risk.

There are one non-residential structure (worth \$800K), one government facility (worth \$300K), one community facility (worth \$30K), one bridge (worth \$4.1M), and two utilities (worth \$9M) are located in the 500-year floodplain and therefore accorded a moderate risk.

The City of Lafayette Steering Committee elected to not use the census block-level data for analysis of residential structures in flood hazard areas.

Winter Storm

Winter storms have widespread impacts that are most often the result of the ice, cold, high winds and flooding they bring. Damage to facilities and infrastructure can be severe, depending on the intensity of the storm event.

Since winter storms are regional events, the entire City of Lafayette is equally vulnerable. Therefore, 3,730 residents, 1200 residential structures (worth \$124M), 50 non-residential structures (value unknown), two government facilities (value \$2.1M), one emergency response facility (value unknown), two educational facilities (value \$13M), nine community facilities (value \$2.2M), 1.5 miles of highway and rail (value unknown), one bridge (value \$4.2M), one transportation facilities (value unknown), and eight utilities (value \$29M) are at risk.

Landslide

The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and

wastewater utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

USGS elevation datasets were used to determine the landslide hazard areas within the City of Carlton. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, the City of Lafayette has landslide prone areas located along stream banks.

The City of Lafayette has 500 residential structures (worth \$62.7M), one government facility (worth \$300K), one educational facility (worth \$12M), eight community facilities (worth \$1.8M), one bridge (worth \$4.1M), and six utilities (worth \$15.5M) located in areas of moderate risk.

One community facility (worth \$100K) and three utilities (worth \$4.5M) are located in areas of high risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

The City of Lafayette has critical infrastructure located within an area with moderate fuel ranks. The moderate fuel rank area contain one non-residential structures (worth \$300K), two government facilities (worth \$2.1M), one emergency response facility (value unknown), two educational facilities (worth \$12.7M), nine community facilities (worth \$2.2M), one transportation facility (value unknown), one bridge (worth \$4.1M), and eight utilities (worth \$18.5M).

The high fuel rank area contain two government facilities (worth \$2.1M), one emergency response facility (value unknown), two educational facilities (worth \$12.7M), nine community facilities (worth \$2.2M), one transportation facility (value unknown), one bridge (worth \$4.1M), and eight utilities (worth \$18.5M).

The very high fuel rank area contains one utility (worth \$2M).

The City of Lafayette Steering Committee elected to not use the census block-level data for analysis of residential structures in the wildland fire hazard area.

Earthquake

Based on PGA shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable slopes. In addition, earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The City of Lafayette is in the eastern portion of Yamhill County in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak acceleration of the ground caused by the earthquake, and for a strong designation corresponds to nine to 20 percent of the acceleration of gravity.

The entire City of Lafayette can be equally affected by earthquakes. Therefore, 3,730 residents, 1200 residential structures (worth \$124M), 50 non-residential structures (value unknown), two government facilities (value \$2.1M), one emergency response facility (value unknown), two educational facilities (value \$13M), nine community facilities (value \$2.2M), 1.5 miles of highway and rail (value unknown), one bridge (value \$4.2M), one transportation facilities (value unknown), and eight utilities (value \$29M) are at risk.

Volcano

Ashfall or tephra from volcanic activity is most likely to impact Yamhill County and the City of Lafayette. Damage is likely to result from volcanic eruption columns and clouds containing volcanic gases, minerals, and rock. The ash columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat, and can distribute acid rain as sulfur dioxide gas mixes with water. Because carbon dioxide is heavier than air and collects in valleys and depressions, these ash particles can create a risk of suffocation as threatening human and animals. Fluorine can cling to ash particles, and pose a toxic threat potentially poisoning grazing livestock and contaminating domestic water supplies.

Due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability. The entire City of Lafayette can be equally affected by volcano ashfall. Therefore, 3,730 residents, 1200 residential structures (worth \$124M), 50 non-residential structures (value unknown), two government facilities (value \$2.1M), one emergency response facility (value unknown), two educational facilities (value \$13M), nine community facilities (value \$2.2M), 1.5 miles of highway and rail (value unknown), one bridge (value \$4.2M), one transportation facilities (value unknown), and eight utilities (value \$29M) are at risk.

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Lafayette are equally at risk of a windstorm event. Therefore, 3,730 residents, 1200 residential structures (worth \$124M), 50 non-residential structures (value unknown), two government facilities (value \$2.1M), one emergency response facility (value unknown), two educational facilities (value \$13M), nine community facilities (value \$2.2M), 1.5 miles of highway and rail (value unknown), one bridge (value \$4.2M), one transportation facilities (value unknown), and eight utilities (value \$29M) are at risk.

Disruption of Utility and Transportation Systems

Transportation system disruption effects life, health, and safety by limiting emergency vehicle mobility, access to hospitals, access to evacuation routes, and access to vital supplies if transport is seriously disrupted for an extended period. Disruption to transportation systems can also cause economic effects from delays, lost commerce, and lost time. Similarly, disruption of utility systems can affect commerce and recreation and fundamental health and safety in Yamhill County and the City of Lafayette. Countywide and citywide disruptions are likely to impact all residents equally. Structural damage from disruption of utility and transportation systems is not expected; rather the risks apply to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the EPA's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses generating hazardous waste from their activities. Transportation routes, including State Highway 99 West and the Willamette and Pacific Railroad, likely to carry hazardous waste were examined, and all facilities within a 0.25 miles radius of those are considered at risk.

In the City of Lafayette, 450 residents, 141 residential structures (worth \$17.7M), 50 non-residential structures (value unknown), two government facilities (worth \$2.1M), one emergency response facility (value unknown), two educational facilities (worth \$12.8M), eight community facilities (worth \$2.1M), one transportation facility (value unknown), one bridge (worth \$4.1M), and two utilities (worth \$15.5M) are considered at risk.

Two government facilities (worth \$2.1M), one emergency response facility (value unknown), one educational facilities (worth \$750K), eight community facilities (worth \$2.1M), and eight utilities (worth \$18.5M) are located with the 0.25 mile-buffered EHS zone.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County's mitigation goals listed in Table F-11, or to revise them to more fully meet the City's needs. The City then proceeded to evaluate potential mitigation actions after finalizing the mitigation goals. Mitigation actions are

activities, measures, or projects that help achieve the goals of a mitigation plan. Table F-12 depicts the City's considered mitigation actions developed during this mitigation planning process. The revised list in Table F-14 delineates those actions the City will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

The City of Lafayette actively participates in FEMA's National Flood Insurance Program (NFIP) and have implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties. They subsequently selected and prioritized City appropriate actions to assure an effective flood mitigation program.

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table F-11. 2006 Yamhill County Mitigation Goals-Considered	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> <ul style="list-style-type: none">- Develop and implement activities to protect human life, commerce, and property from natural hazards.- Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

Table F-12. City of Lafayette Mitigation Actions Considered

Hazard	Status	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
MH	<i>Ongoing</i>		Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)
MH	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load and wind storm power line failure during severe wind or winter ice storm events.
MH	<i>Ongoing</i>		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	Consider		Install lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.
MH	Consider		Retrofit structures to protect them from seismic, floods, high winds, earthquakes, or other natural hazards.
MH	Consider		Identify and pursue funding opportunities to implement mitigation actions.
Flood			
Flood	Consider		Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.
Flood	<i>Ongoing</i>		Develop, implement, and enforce floodplain management ordinances.
Flood	<i>Ongoing</i>		Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	<i>Ongoing</i>		Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
Winter Storm			
Winter Storm	<i>Ongoing</i>		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
Winter Storm	<i>Ongoing</i>		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	Consider		Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter Storm	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line severe wind or winter ice storm event failure.

Table F-12. City of Lafayette Mitigation Actions Considered

Hazard	Status	Comment	Description
Winter Storm	<i>Ongoing</i>		Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.
Landslide			
Landslide	<i>Ongoing</i>		Develop, implement and enforce development restrictions in High Hazard Areas
Wildland Fire			
Wildland Fire	<i>Ongoing</i>		Implement program to maintain fire trails throughout watershed area for access.
Wildland Fire	<i>Ongoing</i>		Reduce underbrush fuel in watershed critical areas.
Wildland Fire	<i>Ongoing</i>		Train and equip fire personnel in wildland fires and familiarize them with the water shed area.
Earthquake (EQ)			
Earthquake	<i>Ongoing</i>		Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, and wastewater systems within the jurisdiction.
Earthquake	Consider		Retrofit or rebuild important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.
Earthquake	<i>Ongoing</i>		Implement and enforce the Uniform, International, and State Building Codes.
Earthquake	<i>Ongoing</i>		Inspect and/or certify all new construction.
Volcano			
Volcano	Consider		Update public emergency notification procedures and develop an outreach program for ash fall events.
Volcano	Consider		Evaluate capability of water treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.
Wind			
Wind	Consider		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.
Wind	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line failure during severe wind or winter ice storm events.
Technological and Manmade Hazards			
Disruption of Utility and Transportation Systems (DUTS)			
DUTS	<i>Ongoing</i>		Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.
DUTS	<i>Ongoing</i>		Review and update emergency response plans for utility disruptions.
DUTS	<i>Ongoing</i>		Identify and prioritize all "jurisdiction owned" & "non-jurisdiction owned" critical facilities that have backup power and emergency operations plans.
DUTS	<i>Ongoing</i>		Purchase backup power systems for all identified critical facilities.

Table F-12. City of Lafayette Mitigation Actions Considered			
Hazard	Status	Comment	Description
Hazardous Materials (HAZMAT)			
HAZMAT	Consider		Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.
HAZMAT	Consider		Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met on September 9, 2008 to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. During the September 9, 2008 meeting, the Committee determined the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

To complete this task, the Steering Committee reviewed the Benefit-Cost Analysis Fact Sheet (Appendix P) and prioritized their list by assessing the risks based on actual past damage and focused on items the City of Lafayette can realistically accomplish.

Upon review, the Steering Committee assigned a high priority ranking to actions best fulfilling the goals of the MHMP and are appropriate and feasible for the City of Lafayette and the responsible entities to implement during the five year lifespan of this version of the MHMP. As such, the Steering Committee determined that only the existing and new mitigation actions that received a high priority ranking would be included in the countywide Mitigation Action Plan. Table F-14 depicts the City of Lafayette's mitigation actions grouped by hazard and in descending priority order within each hazard.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

The City of Lafayette's reviewed the Yamhill County goals and modified them to better suit the City's needs and subsequently adopted the Goals in Table F-13 for the current planning period.

Table F-13. City of Lafayette Mitigation Goals	
Goal Number	Goal Description
1	Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate
2	Promote educational and outreach programs to increase public awareness of the risks associated with natural hazards.
3	Maintain effective partnerships with public organizations and significant agencies for future natural hazard mitigation efforts

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
<ul style="list-style-type: none"> ■ Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? ■ Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? 	
Source: FEMA, July 2008.	

Table F-14 displays the City of Lafayette’s Mitigation Action Plan matrix that describes how the mitigation actions were prioritized, how the overall benefit-costs were taken into consideration, and how each mitigation action will be implemented and administered by the Steering Committee and the applicable responsible entity.

Table F-14. City of Lafayette Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Natural Hazards						
<i>Multi-Hazard (MH)</i>						
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	Public Works Foreman, City Engineer	Ongoing	General Funds, Utility Revenue	BC: TBD TF: Yes	
<i>Flood</i>						
Flood	Provide flood protection to mitigate damage and contamination of wastewater treatment systems.	Treatment Plant Operator	Ongoing	Sewer User Fees	BC: TBD TF: Unknown	
<i>Winter Storm</i>						
Winter Storm	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage, and supply backup power generation.	Public Works Foreman / City Engineer	Ongoing	General Funds, Utility Revenue	BC: TBD TF: Yes	
<i>Landslide</i>						
Landslide	Develop, implement and enforce development restrictions in High Hazard Areas	City Administrator	Ongoing	General Fund	BC: TBD TF: Yes	
<i>Wildland Fire (WF)</i>						
Wildland Fire	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage, and supply backup power generation.	Fire Chief	Ongoing	Water User Fees	BC: TBD TF: Yes	

Table F-14. City of Lafayette Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Earthquake (EQ)						
EQ	Retrofit or rebuild important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.	City Administrator	Ongoing	General Funds, Utility Revenue	BC: TBD TF: Yes	
Volcano						
Volcano	Evaluate capability of treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.	Public Works Foreman / Sewer Treatment Plant Operator	Consider	Water & Sewer User Fees	BC: TBD TF: Yes	
Wind						
Wind	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage, and supply backup power generation.	Public Works Foreman / City Engineer	Ongoing	General Funds, Utility Revenue	BC: TBD TF: Yes	
Technological and Manmade Hazards						
Disruption of Utility and Transportation Systems (DUTS)						
DUTS	Purchase backup power systems for all identified critical facilities.	City Administrator	Ongoing	General Funds, Utility Revenue	BC: TBD TF: Yes	
Hazardous Materials (HAZMAT)						
HAZMAT	Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.	Fire Chief	Ongoing	General Funds, Utility Revenue	BC: TBD TF: Yes	

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Appendix G

City of Newberg

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This appendix contains specific City of Newberg information to support the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section discusses the City of Newberg's planning process by listing Steering Committee membership, documenting public outreach efforts, and summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The City of Newberg is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill that goal, the City organized a Hazard Mitigation Plan development Steering Committee dedicated to identifying hazard threats and developing actions that can be taken to mitigate damage and life losses from those threats.

Table G-1 contains the City's Steering Committee participant list to augment the Yamhill County MHMP planning elements.

Table G-1. City of Newberg Steering Committee	
Name	Agency/Department/Affiliation
Roger Gano, Lead	Emergency Manager
Ken Austin III	Private Citizen-Local Business Man
Spike Sumner	Private Citizen-Local Business Man
Sherry Walker	Private Citizen-Local Business Woman
Jean Nilles	Private Citizens-Retired Business Owner
Elvern Hall	Private Citizens-Retired Business Man
Stan Gaibler	Private Citizen-Retired Farmer

Table G-2 contains the summary of the City's public involvement and planning meeting activities.

Table G-2. City of Newberg Public Involvement Mechanisms	
Mechanism	Description
City Utility Bill mail out	June, Sept, and Oct; Newsletter to introduce project, announce public meetings, and request public input on hazard screening and draft risk assessment
City Website	Newsletters
McMinnville Radio Station	Broadcast public meeting announcement

CAPABILITY ASSESSMENT

Table G-3, G-4, and G-5 contain the City's resources used to support planning activities.

Table G-3. City of Newberg Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Newberg Comprehensive Plan	Policies: 5.1; also Goal F and Policies F.1-F.4; G.1.d,e,g,h; G.5.o; L.1.h, r,a,b,c. Commits City to policies that slow surface water drainage and limit potential damage to structures.
	Yamhill County Comprehensive Plan	Defines governance and development requirements
	Newberg Fire Department 2004 Strategic Plan	Strategic plan to assure that the City's Fire Department continues to provide quality EMT and fire protection services at the lowest reasonable cost.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency. Describes known hazards
	Title 8.70 Hazardous Materials Releases	Provides procedure for coordination among various agencies in the event of hazardous materials releases. Describes known hazards
	Stream Corridor Overlay Subdistrict	Designates and regulates stream corridor overlay subdistrict that limits construction in and around streams and wetlands.
	Maximum lot coverage regulations	Limit impervious surface, slowing runoff.
	Landscaping requirements	Increase water retention and reduces erosion.
	Grading and drainage specifications.	Guide direction of runoff.
	Storm sewer standards.	Assure adequate sizing and design of storm water conveyance facilities.

Table G-4. City of Newberg Administrative and Technical Resources for Hazard Mitigation	
Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	PLANNING DIVISION/Planning and Building Department Director; Associate Planner (2); Assistant Planner (2); Economic Development Coordinator/Planner; ADMINISTRATION/City Manager; ENGINEERING/Senior Engineer, Storm and Transportation Programs; Engineering Technician 2; Engineering Technician 3; Senior Engineer, Water and Wastewater Programs; Associate Engineer
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	PLANNING DIVISION/Associate Planner; ADMINISTRATION/City Manager; ENGINEERING/Senior Engineering, Water and Wastewater Programs; Engineering Technician 3; Engineering Technician 2 (2); Associate Engineer; FIRE DEPARTMENT/Fire Marshall; BUILDING DIVISION/Plans Examiner/Inspector; Plans Examiner; Inspector; Building Official
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	PLANNING/Planning and Building Department Director; Associate Planner (2); Assistant Planner (2); Economic Development Coordinator/Planner; ADMINISTRATION/City Manager; ENGINEERING/Senior Engineer, Storm and Transportation Programs; Engineering Technician 2; Engineering Technician 3; Senior Engineer, Water and Wastewater Programs; Associate Engineer; FIRE DEPARTMENT/Fire Marshall; BUILDING DIVISION/Plans Examiner/Inspector; Plans Examiner; Inspector; Building Official
Floodplain manager	Planning / Building Department Director
Personnel skilled in GIS and/or HAZUS-MH	ENGINEERING/GIS Analyst, Engineering Technician 2 (2), Associate Engineer; PLANNING DIVISION/Planning and Building Director; Associate Planner; Assistant Planner (2)
Director of Emergency Services	ADMINISTRATION/Director of Emergency Services
Finance (grant writers, purchasing)	FINANCE/PLANNING/Economic Development Coordinator/Planner; Associate Planner; ENGINEERING/
Public Information Officers	POLICE/Public Information Office

Table G-5. City of Newberg Financial Resources for Hazard Mitigation	
Financial Resources	Effect on Hazard Mitigation
General funds	No
Authority to levy taxes for specific purposes	Yes, with voter approval
Incur debt through general obligation bonds	Yes
Incur debt through special tax and revenue bonds	No
Incur debt through private activity bonds	No
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which is available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards	
Identifying Hazards	
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.	
Element	
■ Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	
Source: FEMA, July 2008.	

The City of Newberg’s Steering Committee determined that the following could potentially threaten the community. Those hazards identified with an (*) are newly identified by the county as part of the update process – those identified with an (x) are specific to the City of Newberg.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	X
Wind	X
Erosion*	X
ENSO (El Niño / La Niña)*	X
Expansive Soils*	
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	X
Infectious Disease Epidemic*	

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for the City of Newberg to augment the MHMP development process. It comprises:

- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment]must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

The City of Newberg actively participates in FEMA's National Flood Insurance Program (NFIP) and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets within the City that may be affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the City's existing building and infrastructure assets and insured values and are identified in detail in Tables G-6A, G-6B, and G-7.

Tables G-8, G-9, and G-10 portray the critical infrastructure numbers and values, and their potential vulnerability by hazard type.

The City of Newberg seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table G-6A were obtained from the 2000 U.S. Census and Portland State University. It comprises census block level data, and estimates from university conducted community research.

The City's existing building and infrastructure and insured values are identified in Tables G-6A, G-6B, and G-7.

Table G-6A. City of Newberg Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census³	Total Building Count	Total Value of Buildings (\$)¹
18,064	20,565	21,675	6,427	870,215,800

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$135,400 per structure).

² Yamhill county Taxing Districts: http://www.co.yamhill.or.us/assessor/Documents/2007_Taxing_Districts.pdf

³ Portland State University (PSU) 2007 Oregon Population Report.

Table G-6B. City of Newberg NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties²
Newberg	1,885	0	5	1,160,000	377.0	1	0	1

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

²Content and building claims.

(Note – many critical facilities and locations have been identified and included in this inventory and risk assessment – due to their confidential nature, their locations have been “shaded” for publication. The data will remain in the report for the County’s future mitigation planning efforts)

Table G-7. City of Newberg Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Government	City Hall	414 E. 1st St.	Unknown
	Annex	115 S. Howard St.	Unknown
	Public Safety Building	401 E. Third St.	Unknown
	US Post Office	401 E. First St.	Unknown
Emergency Response	Main Fire Station	414 E. 2nd St.	Unknown
	Springbrook Fire Station	3100 Middlebrook Dr.	Unknown
Educational	Benedict Preschool	504 E. 2nd St.	Unknown
	George Fox University	414 N. Meridian	Unknown
	Ewing Young Elementary	17600 N. Valley Rd.	Unknown
	School District Shops	703 S. Blaine St.	Unknown
	Administration Office	714 E. 6th St.	Unknown
	Mabel Rush Elementary	1441 N. Deborah Rd.	Unknown
	Edwards Elementary	715 E. 8th St.	Unknown
	Crater Elementary	203 W. Foothills Dr.	Unknown
	Austin Elementary	2200 N. Center St.	Unknown
	Mountainview Middle School	2015 N. Emery Dr.	Unknown
	Chehalem Valley Middle School	403 W. Foothills Dr.	Unknown
	Future School Property	30150 NE Wilsonville Rd.	Unknown
	Future School Property	30420 NE Siefken Lane	Unknown
	Newberg High School	2400 Douglas Ave.	Unknown
Health Care	Providence Newberg Medical Center	310 Villa Rd.	Unknown
	Providence Newberg Medical Center	218 Villa Rd.	Unknown
	Providence Newberg Medical Center	1515 E. Portland Rd.	Unknown
	Providence Newberg Medical Center	1001 Providence Dr.	Unknown
	Chehalem Health & Rehab Center	1900 E. Fulton St.	Unknown
	Senior Center	303 W. Foothills Dr.	Unknown

Table G-7. City of Newberg Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	Avamere-Newberg	730 Foothills Dr.	Unknown
	Friendsview Village	1301 E. Fulton St.	Unknown
	Newberg Care Home	1500 E. First St.	Unknown
	Huffman House	1301 N. College St.	Unknown
Community	Assembly of God	502 S. St. Paul Hwy	Unknown
	Astor House	3801 Hayes St.	Unknown
	Calvary Chapel Church	120 S. Elliott Rd.	Unknown
	Chehalem Airpark	NE Dopp Rd.	Unknown
	Chehalem Springs	3802 Hayes St.	Unknown
	Christ Community Church	611 N Main St.	Unknown
	Church of Christ	2505 Haworth Ave	Unknown
	Church of God	715 S. River St.	Unknown
	Central Community Center	415 E. Sheridan St.	Unknown
	Swimming Pool	1802 Haworth Ave.	Unknown
	Nicholas Park	1806 Haworth Ave.	Unknown
	Community Center	500 E. 2nd St.	Unknown
	Memorial Park	411 S. Blaine St.	Unknown
	Vacant Land	17800 NE Chehalem Dr.	Unknown
	Vacant Land	3720 Mistletoe Dr.	Unknown
	Vacant Land	3575 Oak Grove St.	Unknown
	Vacant Land	4500 E. Fernwood Rd.	Unknown
	Vacant Land	4555 E. Fernwood Rd.	Unknown
	Vacant Land	4351 E. Fernwood Rd.	Unknown
	Jaquith Park (East)	1215 N. College St.	Unknown
	Vacant Land	1060 E. Edgewood Dr.	Unknown
	Ewing Young Park	1207 S. Blaine St.	Unknown
	Armory Community Center	620 Morton St.	Unknown
	Jaquith Park (West)	1414 N. Main St.	Unknown
	Vacant Land	2901 Winchester Dr.	Unknown

Table G-7. City of Newberg Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	CPRD Offices	125 S. Elliott Rd.	Unknown
	Skate Park	1201 S. Blaine St.	Unknown
	Vacant Land	169 Aaron Way	Unknown
Community	Vacant Land	1001 Hilltop Dr.	Unknown
	Chehalem Valley Baptist Church	26155 NE Bell Rd.	Unknown
	Episcopal Church	110 S. Everest Rd.	Unknown
	First Baptist Church	1619 E. 2nd St.	Unknown
	First Baptist Church	24950 North Valley Rd.	Unknown
	FourSquare Gospel	115 W. 3rd St.	Unknown
	Friends Church	200 S. College St.	Unknown
	Friends Church cemetery	500 S. Everest Rd.	Unknown
	Friends Church	600 E. 3rd St.	Unknown
	Friends Church vacant land	605 E. 3rd St.	Unknown
	Friends Church vacant land	607 E. 3rd St.	Unknown
	Friends Church vacant land	215 S. College St.	Unknown
	Godsong Community Church	1025 Industrial Parkway	Unknown
	Hazelden NW	1901 Esther St.	Unknown
	Jehovah's Witness Church	1709 Hoskins St.	Unknown
	Joyful Servant Lutheran	1716 N. Villa Rd.	Unknown
	Mormon Church	1212 Deborah Rd.	Unknown
	Nazarene Church	23177 NE Old Yamhill Rd.	Unknown
	Newberg Christian Church	2315 Villa Rd.	Unknown
	Jaquith Park (East)	1215 N College St.	Unknown
	Mountainview Park	201 E. Mountainview Dr.	Unknown
	Hospital Thrift Store	305 S. Howard St.	Unknown
	Scout House	411 S. Howard St.	Unknown
	Hoover Park	114 S. River St.	Unknown
	Scott Levitt Park	1310 E. 10th St.	Unknown
	Vacant Land	1542 E. Portland Rd.	Unknown

Table G-7. City of Newberg Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	Kiwanis Park	503 E. Sheridan St.	Unknown
	Vacant Land	404 E. 3rd St.	Unknown
	Vacant Land	412 E. 3rd St.	Unknown
Community	Vacant Land	408 E. 3rd St.	Unknown
	Library Annex	211 N. Howard St.	Unknown
	Vacant Land	3613 Ivy Dr.	Unknown
	Francis Square	625 E. 1st St.	Unknown
	Vacant Land	508 W 3rd St.	Unknown
	Vacant Land	1415 E. 1st St.	Unknown
	Vacant Land	2900 N. Chehalem Dr.	Unknown
	Vacant Land	411 E 1st. St.	Unknown
	Newberg Gospel Church	4301 N. College St.	Unknown
	Newberg Public Library	503 E. Hancock St.	Unknown
	Northside Community Church	1800 Hoskins St.	Unknown
	NV Friends Church	4020 N. College St.	Unknown
	Open Bible Church	1605 N. College St.	Unknown
	Presbyterian Church	501 Mission Dr.	Unknown
	Vacant Land	603 S. Meridian St.	Unknown
	2nd St. Community Church	504 E. First St.	Unknown
	Seventh Day Adventist	530 Edgewood Dr.	Unknown
	Sportsman Airpark	504 S. Airpark Way	Unknown
	St. Peter Catholic Church	2315 N. Main St.	Unknown
	Trinity Orthodox Presbyterian	600 E. Columbia Dr.	Unknown
	United Methodist Church	1205 Deborah Rd.	Unknown
	Zion Lutheran Church	301 S. River St.	Unknown
	Word of Faith Church	108 S. Howard St.	Unknown
State and Federal Highways	Highway Maintenance Station	801 N. College St.	Unknown
	Hwy 99W		5 miles within the city
	Hwy 219		5 miles within the city

Table G-7. City of Newberg Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	Hwy 240		0 miles within the city
	Sunnycrest Rd.		0 miles within the city
	Dayton Ave.		.75 miles within the city
Railroads	Willamette-Pacific Railroad		5 miles within the city
Bridges	Wynooski/ Willamette River bridge		Unknown
	Chehalem 99W Bridge		Unknown
	St. Paul Hwy 219 Bridge		Unknown
	Chehalem Hwy 240 Bridge		Unknown
	Chehalem/ Dayton Ave. Bridge		Unknown
	Sunnycrest/ Chehalem Bridge		Unknown
Utilities	Newberg Water Reservoir		Unknown
	Pump Station		Unknown
	Pump Station		Unknown
	Water Reservoir		Unknown
	Sewer Treatment Plant		Unknown
	Water Treatment Plant		Unknown
	PW Maintenance Yard		Unknown
	Newberg Garbage Service		Unknown
	PGE		Unknown
	Sportsman Airpark		Unknown
	Verizon Telephone		Unknown
	Western Helicopter		Unknown

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is thoroughly discussed in the Yamhill County MHMP, Section 6, which generated the following Hazard Exposure Analysis Overviews. Tables G-8, G-9, and G-10 depict in tabular form results obtained from the GIS analysis depicted in hazard figures located in Appendix K.

Table G-8. City of Newberg Potential Hazard Exposure Analysis Overview-Population and Buildings

			Population Number	Buildings			
Hazard Type		Hazard Area		Residential		Non-Residential	
		Methodology		Number	Value (\$) ¹	Number	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	1,474	199,579,600	15	unknown
	High	100-year floodplain	--	1,474	199,579,600	15	unknown
Winter Storm		descriptive	21,675	6,427	870,215,800	62	unknown
Landslide	Moderate	14-32 degrees	--	2,454	332,271,600	22	unknown
	High	>32 degrees	--	564	79,365,600	3	unknown
Wildland Fire	Moderate	Moderate fuel rank	--	5,566	753,636,400	52	unknown
	High	High fuel rank	--	4,737	641,389,800	60	unknown
	Very High	Very high fuel rank	--	758	102,633,200	5	unknown
	Extreme	Extreme fuel rank	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	6,427	870,215,800	62	unknown
	Very strong	>20-40% (g)	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--
Volcano		descriptive	21,675	6,427	870,215,800	62	unknown
Wind		descriptive	21,675	6,427	870,215,800	62	unknown
ENSO (El Nino and La Nina)		descriptive	21,675	--	--	--	--
Drought		descriptive		--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	21,675	--	--	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	4,429	599,686,600	61	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--
Terrorism		descriptive	--	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$135,400 per structure). Note-population by parcel was not available at the time this document was prepared. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed.

Table G-9. City of Newberg Potential Hazard Exposure Analysis Overview-Critical Facilities

			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--	--	--
	High	100-year floodplain	--	--	--	--	--	--	1	unknown	7	unknown
Winter Storm		descriptive	4	unknown	2	unknown	14	unknown	10	unknown	79	unknown
Landslide	Moderate	14-32 degrees	--	--	--	--	2	unknown	2	unknown	24	unknown
	High	>32 degrees	--	--	--	--	--	--	1	unknown	2	unknown
Wildland Fire	Moderate	Moderate fuel rank	4	unknown	2	unknown	14	unknown	10	unknown	79	unknown
	High	High fuel rank	4	unknown	2	unknown	11	unknown	7	unknown	70	unknown
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	3	unknown
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	4	unknown	2	unknown	14	unknown	10	unknown	79	unknown
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	4	unknown	2	unknown	14	unknown	10	unknown	79	unknown
Wind		descriptive	4	unknown	2	unknown	14	unknown	10	unknown	79	unknown
ENSO (El Nino and La Nina)		descriptive	--	--	--	--	--	--	--	--	--	--
Drought		descriptive	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	--	--	--	--	--	--	--	--	--	--
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	4	unknown	2	unknown	9	unknown	9	unknown	71	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	4	unknown	2	unknown	9	unknown	9	unknown	51	unknown
Terrorism		descriptive	4	unknown	2	unknown	14	unknown	10	unknown	79	unknown

1 – values not available at this time

Table G-10. City of Newberg Potential Hazard Exposure Analysis Overview-Critical Infrastructure

			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)¹	Miles	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	2	unknown	--	--	--	--	--	--
	High	100-year floodplain	--	--	--	--	4	unknown	--	--	1	unknown	--	--
Winter Storm		descriptive	6	unknown	1	unknown	6	unknown	--	--	12	unknown	--	--
Landslide	Moderate	14-32 degrees	--	--	--	--	5	unknown	--	--	7	unknown	--	--
	High	>32 degrees	--	--	--	--	2	unknown	--	--	1	unknown	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	6	unknown	1	unknown	11	unknown	--	--
	High	High fuel rank	--	--	--	--	6	unknown	--	--	10	unknown	--	--
	Very High	Very high fuel rank	--	--	--	--	2	unknown	--	--	2	unknown	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	6	unknown	1	unknown	6	unknown	--	--	12	unknown	--	--
Wind		descriptive	6	unknown	1	unknown	6	unknown	--	--	12	unknown	--	--
ENSO (El Nino and La Nina)		descriptive	--	--	--	--	--	--	--	--	--	--	--	--
Drought		descriptive	--	--	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	--	--	--	--	--	--	--	--	--	--	--	--
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	6	unknown	1	unknown	6	unknown	1	unknown	10	unknown	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	6	unknown	1	unknown	--	--	1	unknown	7	unknown	--	--
Terrorism		descriptive	6	unknown	1	unknown	6	unknown	--	--	12	unknown	--	--

1 – values not available at this time

SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section describes each hazard and the community's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for the City of Newberg. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In the City of Newberg, 1,474 residential structures (value \$199.6M), 15 non-residential structures, one care facility, seven community facilities, four bridges, and one utility (values unknown) are located within the boundaries of the 100-year floodplain and therefore accorded a high risk.

There are 1,474 residential structures (value \$199.6M), 15 non-residential structures, and two bridges (values unknown) located within the boundaries of the 500-year floodplain and therefore accorded a moderate risk.

Winter Storm

Winter storms have widespread impacts that are most often the result of the ice, cold, high winds and flooding they bring. Damage to facilities and infrastructure can be severe, depending on the intensity of the storm event.

Since winter storms are regional events, the entire City of Newberg can be equally affected. Therefore 21,675 residents, 6,427 residential structures (value \$870.2M), 62 non-residential structures, four government facilities, two emergency response facilities, 14 educational facilities, 10 care facilities, 79 community facilities, six segments of highways, one segment of railroad, six bridges, and 12 utilities (values unknown) are at risk.

Landslide

The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and waste water utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

USGS elevation datasets were used to determine the landslide hazard areas within the City of Newberg. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, the City of Newberg has 2,454 residential structures (value \$332.3M), 22 non-residential structures, two educational facilities, two care facilities, 24 community facilities, five bridges, and seven utilities (values unknown) that are located in areas of moderate risk.

There are 564 residential structures (value \$79.4M), three non-residential structures, one care facility, two community facilities, two bridges, and one utility (values unknown) located within an area of high risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

The City of Newberg has critical facilities and infrastructure located within areas with moderate, high, and very high fuel ranks. Moderate fuel rank areas contain 5,566 residential structures (value \$753.6M), 52 non-residential structures, four government facilities, two emergency response facilities, 14 educational facilities, ten care facilities, 79 community facilities, one transportation facility, six bridges, and 11 utilities (values unknown).

High fuel rank areas contain 4,737 residential structures (value \$641.4M), 60 non-residential structures, four government facilities, two emergency response facilities, 11 educational facilities, seven care facilities, 70 community facilities, six bridges, and 10 utilities (values unknown).

Very high fuel rank areas contain 758 residential structures (value \$102.6M), 5 non-residential structures, three community facilities, two bridges, and two utilities (values unknown).

Earthquake

Based on PGA shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas, however, is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable slopes. As well as landslide, earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The City of Newberg is in the eastern portion of Yamhill County, in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak acceleration of the ground caused by the earthquake, and for a strong designation corresponds to 9-20 percent of the acceleration of gravity.

The entire City of Newberg can be equally affected by earthquakes. Therefore 21,675 residents, 6,427 residential structures (value \$870.2M), 62 non-residential structures, four government facilities, two emergency response facilities, 14 educational facilities, 10 care facilities, 79 community facilities, six segments of highways, one segment of railroad, six bridges, and 12 utilities (values unknown) are at risk from strong shaking earthquakes.

Volcano

As discussed in Chapter 5, volcanic activity is most likely to impact Yamhill County and the City of Newberg in the form of ashfall or tephra. Damage is likely to result from volcanic eruption columns and clouds which contain volcanic gases, minerals, and rock. The columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat, and can distribute acid rain as sulfur dioxide gas mixes with water. Additionally, these particles can create a risk of suffocation as carbon dioxide is heavier than air and collects in valleys and depressions threatening human and animals. They further pose a toxic threat from fluorine which clings to ash particles potentially poisoning grazing livestock and contaminating domestic water supplies.

However, due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability, although it can be assumed that the entire population is at risk, including 21,675 residents, 6,427 residential structures (value \$870.2M), 62 non-residential structures, four government facilities, two emergency response facilities, 14 educational facilities, 10 care facilities, 79 community facilities, six segments of highways, one segment of railroad, six bridges, and 12 utilities (values unknown).

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Newberg are equally at risk of a windstorm event. Therefore 21,675 residents, 6,427 residential structures (value \$870.2M), 62 non-residential structures, four government facilities, two emergency response facilities, 14 educational facilities, 10 care facilities, 79 community facilities, six segments of highways, one segment of railroad, six bridges, and 12 utilities (values unknown) are equally susceptible to this hazard.

ENSO (El Niño and La Niña)

ENSO events cause large scale weather pattern changes throughout Yamhill County, and across the entire State of Oregon. In the City of Newberg, El Niño periods are generally drier, with an increased likelihood of drought, while La Niña periods tend to be wetter and colder, with an increased risk of winter storm and the associated hazards it brings, particularly flooding and landslides.

The changes wrought by ENSO are on a very large scale, so it is difficult to quantify their impacts locally. Instead, ENSO is manifested in the hazards it influences, such as winter storms,

flooding, landslides and drought. Therefore, the quantitative impacts have been summarized in those categories.

Drought

State-wide droughts have historically occurred in Oregon, and as it is a region-wide phenomenon, all residents are equally at risk. Structural damage from drought is not expected; rather the risks apply to humans and resources. Industries important to the City of Newberg's local economy such as agriculture, fishing, and timber have historically been affected, and any future droughts would have tangible economic and potentially human impacts.

Disruption of Utility and Transportation Systems

Transportation system disruption impacts range from effects on life, health, and safety (in the form of emergency vehicle mobility, access to hospitals, access to evacuation routes, and access to vital supplies if transport is seriously disrupted for an extended period) to the economic effects of delays, lost commerce, and lost time. Similarly, disruption of utility systems can affect Yamhill County and the City of Newberg at the level of commerce and recreation as well as at the level of fundamental health and safety. Countywide and citywide disruptions are likely to impact all residents equally. Structural damage from disruption to these systems is not expected; rather the risks apply to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the EPA's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses that generate hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and all facilities within a 0.25 miles radius of transportation routes and EHS sites are considered at risk.

In the City of Newberg 4,429 residential structures (value \$599.7M), 61 non-residential structures, four government facilities, two emergency response facilities, nine educational facilities, nine care facilities, 71 community facilities (values unknown), and one transportation facility are considered at risk. Additionally, six highways, one railroad, six bridges and ten utilities (values unknown) are located within the 0.25 miles of a transportation route.

There are four government facilities, two emergency response facilities, nine educational facilities, nine care facilities, 51 community facilities, and one transportation facility, six highways, one railroad, and seven utilities (values unknown) considered at risk with the 0.25 mile radius of an EHS site.

Terrorism

It is difficult to determine the scope of any terrorist threat to the City of Newberg. Although there seem to be few high-profile targets present, it is impossible to predict future terrorist events. Depending on the extent of the action, the community may suffer economic loss, disruption of utilities, and cleanup relating to explosions and other facility damages. All facilities and residents are at equal risk of being impacted by this threat.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County’s mitigation goals listed in Table G-11, or to revise them to more fully meet the City’s needs. The City then proceeded to evaluate potential mitigation actions after finalizing the mitigation goals.

Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Table G-12 depicts the City’s “considered” mitigation actions developed during this mitigation planning process. The revised list in Table G-14 delineates those actions the City will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction’s participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

The City of Newberg actively participates in FEMA’s National Flood Insurance Program (NFIP) and have implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City’s Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties. They subsequently selected and prioritized City appropriate actions to assure an effective flood mitigation program.

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table G-11. 2006 Yamhill County Mitigation Goals-Considered	
Goal Number	Goal Description
1	<p>EMERGENCY OPERATIONS</p> <p><i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.</p>
2	<p>EDUCATION AND OUTREACH</p> <p><i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.</p>
3	<p>PARTNERSHIPS</p> <p><i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.</p>
4	<p>PREVENTIVE</p> <p><i>Goal Statements:</i></p> <ul style="list-style-type: none"> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	<p>NATURAL RESOURCES UTILIZATION</p> <p><i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.</p>
6	<p>IMPLEMENTATION</p> <p><i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.</p>

Table G-12. City of Newberg Mitigation Actions Considered

Hazard	Status	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
MH	<i>Ongoing</i>		Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.
MH	<i>Ongoing</i>		Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	<i>Ongoing</i>		Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load and wind storm power line failure during severe wind or winter ice storm events.
MH	<i>Ongoing</i>		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	<i>Ongoing</i>		Install lightening rods and lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.
MH	<i>Ongoing</i>		Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
MH	<i>Ongoing</i>		Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.
MH	Consider		Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to acquire, relocate, elevate, and/or flood proof to protect the threatened population.
MH	<i>Ongoing</i>		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
MH	<i>Ongoing</i>		Retrofit structures to protect them from seismic, floods, high winds, earthquakes, or other natural hazards.
MH	Consider		Establish a formal role for the jurisdictional Hazard Mitigation Planning Committees to develop a sustainable process to implement, monitor, and evaluate citywide mitigation actions.
MH	Consider		Identify and pursue funding opportunities to implement mitigation actions.
MH	Consider		Develop public and private sector partnerships to foster hazard mitigation activities.
MH	Consider		Integrate the Mitigation Plan findings into planning and regulatory documents and programs and into enhanced emergency planning.

Table G-12. City of Newberg Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	<i>Ongoing</i>		Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.
Flood	Consider		Develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.
Flood	Consider		Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100-year floodplain using survey elevation data.
Flood	Consider		Implement mitigation measures identified by critical facilities' owners, and other facility owners, to protect facilities located within the 100-year floodplain.
Flood	Consider		Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current USACOE flood data.
Flood	Consider		Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
Flood	<i>Ongoing</i>		Develop, implement, and enforce floodplain management ordinances.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof critical facilities.
Flood	Consider		Install new streamflow and rainfall measuring gauges.
Flood	<i>Ongoing</i>		Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	Consider		Construct earthen berms to divert flood flows into bridge or culvert openings. The earth fill should be erosion-resistant and the berms should be covered with erosion-resistant fabric, armoring materials, or vegetation.
Flood	Consider		Increase culvert size to increase its drainage efficiency.
Flood	Consider		Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
Flood	<i>Ongoing</i>		Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
Flood	Consider		Construct debris deflectors to deflect the major portion of debris away from culvert entrances and bridge piers. They are normally "V" shaped.
Flood	Consider		Install debris fins upstream of a culvert to align debris so that the debris will pass through a drainage opening without clogging the inlet. They are sometimes used on bridge piers to deflect drifting materials.
Flood	Consider		Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.
Flood	Consider		Create relief drainage ditch opening using a culvert, bridge, or multiple culverts; to relieve rapid water accumulation during high water flow events. .
Flood	Consider		Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
Winter Storm	<i>Ongoing</i>		Develop and implement strategies and educational outreach programs for debris management from severe winter storms.
Winter Storm	Consider		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.

Table G-12. City of Newberg Mitigation Actions Considered

Hazard	Status	Comment	Description
Winter Storm	<i>Ongoing</i>		Update or develop, implement, and maintain jurisdictional debris management plans.
Winter Storm	<i>Ongoing</i>		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	Consider		Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.
Winter Storm	<i>Ongoing</i>		Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
Winter Storm	<i>Ongoing</i>		Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
Winter Storm	Consider		Purchase NOAA Weather radios and develop a web portal linking residents to various weather information sites. (NWS, FEMA, The Weather Channel).
Winter Storm	Consider		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
Winter Storm	Consider		Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests.
Winter Storm	<i>Ongoing</i>		Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter Storm	<i>Ongoing</i>		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line severe wind or winter ice storm event failure.
Winter Storm	Consider		Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.
Landslide	<i>Ongoing</i>		Complete a landslide location inventory, identify threatened critical facilities and other buildings and infrastructure.
Landslide	Consider		Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
Landslide	<i>Ongoing</i>		Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).
Landslide	<i>Ongoing</i>		Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
Landslide	<i>Ongoing</i>		Develop comprehensive geological landslide and rockslide prone area maps.
Landslide	Consider		Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.
Landslide	Consider		Identify and seasonally restrict recreational and construction activities in high landslide areas.
Landslide	Consider		Develop, implement and enforce property development landslide risk assessment procedures to identify potential facility vulnerability.

Table G-12. City of Newberg Mitigation Actions Considered

Hazard	Status	Comment	Description
Wildland Fire	<i>Ongoing</i>		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Wildland Fire	<i>Ongoing</i>		Provide real-time internet access and interagency cooperation to decrease wildland fire warning times.
Wildland Fire	Consider		Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
Wildland Fire	Consider		Promote FireWise building siting, design, and construction materials.
Wildland Fire	Consider		Develop FireWise Public Service Announcements (PSA).
Wildland Fire	<i>Ongoing</i>		Provide wildland fire information in an easily distributed format for all residents.
Wildland Fire	<i>Ongoing</i>		Schedule and perform government facility "fire drills" at least twice per year.
Wildland Fire	<i>Ongoing</i>		Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.
Wildland Fire	<i>Ongoing</i>		Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high risk areas.
Wildland Fire	<i>Ongoing</i>		Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.
Wildland Fire	<i>Ongoing</i>		Identify, develop, and implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.
Earthquake	<i>Ongoing</i>		Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.
Earthquake	Consider		Identify high seismic hazard areas; develop a wood-frame residential building inventory and an outreach program to educate population concerning facilities particularly vulnerable to earthquake damage, such as pre-1940s homes and homes with cripple wall foundations.
Earthquake	Consider		Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Earthquake	<i>Ongoing</i>		Retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.
Earthquake	<i>Ongoing</i>	(county & state bridges)	Retrofit bridges that are not seismically adequate for lifeline transportation routes.
Earthquake	<i>Ongoing</i>		Update existing (or adopt the most current) Uniform Building Code
Earthquake	<i>Ongoing</i>		Implement and enforce the Uniform, International, and State Building Codes.
Earthquake	<i>Ongoing</i>		Inspect and/or certify all new construction.

Table G-12. City of Newberg Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake	<i>Ongoing</i>		Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.
Earthquake	<i>Ongoing</i>		Develop outreach program to educate population concerning household, business, and public facility mitigation measures. For example, staff public information tables at fairs, safety events, and festivals.
Earthquake	<i>Ongoing</i>		Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
Earthquake	<i>Ongoing</i>	as money permits	Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.
Earthquake	<i>Ongoing</i>		Identify and prioritize a list of critical facilities with unreinforced masonry problems including non-structural projects such as brick chimney bracing or replacement, water heater bracing, and anchoring, etc.
Earthquake	<i>Ongoing</i>		Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.
Earthquake	<i>Ongoing</i>		Develop outreach program for educating private facilities concerning alternative or emergency power source acquisition to enable them to deliver food, fuel, and medical services during disaster emergency response and recovery efforts.
Earthquake	<i>Ongoing</i>		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Earthquake	<i>Ongoing</i>		Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.
Volcano	Consider		Update public emergency notification procedures and develop an outreach program for ash fall events.
Volcano	Consider		Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.
Volcano	Consider		Evaluate capability of water treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.
Volcano	Consider		Evaluate ash impact on storm water drainage system and develop mitigation actions.
Wind	<i>Ongoing</i>	for new construction	Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)
Wind	<i>Ongoing</i>		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.
Wind	<i>Ongoing</i>		Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.
Wind	<i>Ongoing</i>		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line failure during severe wind or winter ice storm events.
ENSO	Consider		Educate public regarding weather patterns associated with El Niño / La Niña.
Drought	Consider		Develop educational programs and initiatives related to water conservation and irrigation during drought periods.
DUTS	<i>Ongoing</i>		Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.
DUTS	<i>Ongoing</i>		Review and update emergency response plans for utility disruptions.

Table G-12. City of Newberg Mitigation Actions Considered

Hazard	Status	Comment	Description
DUTS	Consider		Review and update emergency response plans for transportation route disruptions.
DUTS	<i>Ongoing</i>		Identify and prioritize all “jurisdiction owned” & “non-jurisdiction owned” critical facilities that have backup power and emergency operations plans.
DUTS	Consider		Purchase backup power systems for all identified critical facilities.
HAZMAT	<i>Ongoing</i>		Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.
HAZMAT	<i>Ongoing</i>		Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.
HAZMAT	<i>Ongoing</i>		Evaluate existing security measures for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS) and enhance security as necessary.
HAZMAT	<i>Ongoing</i>		Evaluate seismic bracing/anchoring for sites with large quantities of HS or any quantities of EHS.
HAZMAT	<i>Ongoing</i>		Train Public Works staff to identify EHS and to follow EMS protocols.
HAZMAT	Consider		Develop outreach program to educate the public regarding chemical hazards, safe handling, storage, and disposal procedures.
HAZMAT	<i>Ongoing</i>		Research, develop, and implement methods to protect waterways from hazardous materials events.
HAZMAT	<i>Ongoing</i>		Prepare a site-specific summary of hazardous materials used, stored, and commonly transported in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.
Terrorism	Consider		Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.
Terrorism	<i>Ongoing</i>		Upgrade physical security, detection, and response capability for critical facilities using information obtained from hazard assessments and risk analysis. Include water systems and any high-profile facilities such as major timber industry facilities and sites with large quantities of HS and EHS.

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met on in September, 2008 to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. The Committee then met a second time in September, 2008 to determine the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

The City of Newberg Steering Committee evaluated the Benefit-Cost Analysis Fact Sheet (Appendix P) for prioritizing its “considered” mitigation actions listed in Table G-12 and to consider the opportunities and constraints of implementing each particular mitigation action. The Steering Committee determined that the committee consisted of sufficient expertise to select those mitigation actions that would most benefit the City without using the STAPLE-E evaluation tool.

Upon review, the Steering Committee assigned a high priority ranking to actions that best fulfill the goals of the MHMP and are appropriate and feasible for the City and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined that only the existing and new mitigation actions that received a high priority ranking would be included in the countywide Mitigation Action Plan. Table G-14 depicts the City’s mitigation actions grouped by hazard and in descending priority order only within each hazard. The hazard order does not depict the Communities hazard priority ranking.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

The City of Newberg reviewed the Yamhill County goals and determined they meet the City's needs and subsequently implemented the Goals in Table G-13 for the current planning period.

Table G-13. City of Newberg Mitigation Goals	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
<ul style="list-style-type: none"> ■ Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? ■ Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? 	
Source: FEMA, July 2008.	

Table G-14 displays the City of Newberg's Mitigation Action Plan matrix that lists mitigation actions by hazard and are only prioritized within each hazard, not in total. Each mitigation action will be implemented and administered by the applicable managing department, agency, or responsible entity.

***Whenever TBD is used, it means that a benefit/cost analysis will be completed as a project is developed to validate the most appropriate mitigation action.*

Table G-14. City of Newberg Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Multi Hazard (MH) (Hazard Priority 4)						
MH	Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	Emergency Management office to work with various departments and agencies within the City of Newberg	0-3 years	General Fund	BC: TBD TF: Yes	
MH	Complete critical facility data collection to allow a more thorough vulnerability analysis for the City's infrastructure.	Administration	1-5 years	General Fund	BC: TBD TF: Yes	
Winter Storm (Hazard Priority 2)						
Winter Storm	Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.	Emergency Management office to work with various departments and agencies within the City of Newberg	0-2 years	General Fund, HMGP, HMA, HSGP	BC: TBD TF: Yes	
Wildland Fire (Hazard Priority 3)						
Wildland Fire	Identify critical facilities and vulnerable populations based on mapped high hazard areas.	Emergency Management office to work with various departments and agencies within the City of Newberg	0-2 years	General Fund	BC: TBD TF: Yes	

Table G-14. City of Newberg Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit- Costs / Technical Feasibility	Comments
<i>Earthquake (Hazard Priority 1)</i>						
Earthquake	Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.	Emergency Management office to work with various departments and agencies within the City of Newberg	0-2 years	General Fund, HMGP	BC: TBD TF: Yes	
Earthquake	Retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.	Emergency Management office to work with various departments and agencies within the City of Newberg	0-5 years	General Fund, HMGP, HMA, HSGP, NEHRP	BC: Yes TF: Yes	This action item will only be accomplished with federal funding!

Appendix H

City of Sheridan

This appendix contains specific City of Sheridan information to support the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section supports the City of Sheridan's planning process by listing Steering Committee membership, documenting public outreach efforts, and summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The City of Sheridan is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill that goal, the City organized a Hazard Mitigation Plan development Steering Committee dedicated to identifying hazard threats and developing actions that can be taken to mitigate damage and life losses from those threats.

Table H-1 contains the City's Steering Committee participant list to augment the Yamhill County MHMP planning elements.

Table H-1. City of Sheridan Steering Committee	
Name	Agency/Department/Affiliation
Yvonne Hamilton	Deputy City Recorder
Frank Sheridan	City Manager
Lonnie Hinchcliff	Director of Public Works

Table H- 2 contains the summary of the City's public involvement and planning meeting activities.

Table H-2. City of Sheridan Public Involvement Mechanisms	
Mechanism	Description
April Kickoff Newsletter	Explained plan development process and solicited input and comments.
Website "	We provide info gleaned from FEMA on the web along with some information specific to the area.
Newsletter Distribution	Highlights some specific areas and refers to City website.
Community Meeting	Outreach to various groups within the community.
August 15, 2008 Countywide Public Meeting, 10 a.m., 2 p.m., Yamhill County Public Works Auditorium, McMinnville, OR	Presented draft risk assessment results and provided opportunity to comment.
August 18, 2008 Countywide Public Meeting, 6 p.m., Yamhill County Public Works Auditorium, McMinnville, OR	Presented draft risk assessment results and provided opportunity to comment.

CAPABILITY ASSESSMENT

Table H-3, H-4, and H-5 contain the City's resources used to support planning activities.

Table H-3. City of Sheridan Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Emergency Operations Plan (2006)	Identifies emergency planning, policies, procedures, and response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies.
	Comprehensive Plans	Guides governance, development, land-use, and floodplain management
	FEMA Flood Mitigation Plan	2/3 of Sheridan is within the 100 year floodplain. Plan includes ordinances and requirements to carefully evaluate development and restrict floodplain changes.
	Sheridan Area Waste Treatment Management Plan	Sheridan is designate as a Sewerage Works Implementation Agency. This plan delineates responsibility for waste management an essential aspect for ensuring waste is not sited near water sources, minimized environmental impact, and health and safety of community.
	Sheridan Transportation System Plan	Designates arterial, collector, and local street and proposed street to prioritize street development and maintenance.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
	CRS Community	Has rating of 8-effective floodplain ordinances reduce flood impact and shows community is effectively striving to mitigate flood damages.
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency. Provides information concerning known hazards
	Title 8.70 Hazardous Materials Releases	Provides procedure for coordination among various agencies in the event of hazardous materials releases. Provides information concerning known hazards
	Development Code	Development Codes in Comp Plan. Regulates building and land-use development within hazard areas.
	Subdivision Ordinances	Establishes regulations and standard for subdividing and land partitioning within the City. Transportation improvements, public facilities and services, energy conservation and recreational standards are specifically addressed during the review procedure for a subdivision plat or partitioning request.
	Zoning Ordinances	Implementation of various community resource policies restricting development within hazard areas

Table H-3. City of Sheridan Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Effect on Hazard Mitigation
Policies (Municipal Codes)	Site Design Review	Evaluates commercial and industrial development impact to community resources. Ensures aesthetically pleasing, sited to efficiently use public services, and planning actions to best benefit the community, and ensures sustainability from hazards
	Building Codes	Help to assure safety housing by defining standard for structural strength and standards for fire, safety, plumbing and electrical installation.
	Agency Review and Coordination	Ensures buildings comply with established codes to ensure sustainability from hazards
	Mobile Homes and Mobile Home Parks	Standards and restrictions pertaining to mobile homes and mobile home parks locations. Ensures they are not sited within hazard zones and ensures they resist damages from known hazards.

Table H-4. City of Sheridan Administrative and Technical Resources for Hazard Mitigation	
Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Contract engineer; planner contract - Jim Jenks Mid-Willamette council of Governments
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Yes, Murray Smith and Assoc, PE
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Yes
Floodplain manager	Jim Jenks (City Planner & Floodplain Manager)
Personnel skilled in GIS and/or HAZUS-MH	No
Director of Emergency Services	Frank Sheridan (City Manager)
Finance (grant writers, purchasing)	Joel Wade (Finance Director) Contract out grant writing
Public Information Officers	Frank Sheridan

Table H-5. City of Sheridan Financial Resources for Hazard Mitigation	
Financial Resources	Effect on Hazard Mitigation
General funds	Limited
Authority to levy taxes for specific purposes	Vote of citizens
Incur debt through general obligation bonds	Up to \$50,000 then a vote of the people
Incur debt through special tax and revenue bonds	Revenue bonds, Enterprise funds for water and sewer, don't think can incur debt through special tax
Incur debt through private activity bonds	Economic Development through the State
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards	
Identifying Hazards	
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.	
Element	
■ Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	
Source: FEMA, July 2008.	

The City of Sheridan's Steering Committee determined that the following hazards could potentially threaten the community. Those hazards identified with an (*) are newly identified by the county as part of the update process – those identified with an (x) are specific to the City of Sheridan.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	X
Wind	X
Erosion*	
ENSO (El Niño / La Niña)*	
Expansive Soils*	
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	X
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	
Infectious Disease Epidemic*	

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for the City of Sheridan to augment the MHMP development process. It comprises:

- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment]must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

The City of Sheridan actively participates in FEMA's National Flood Insurance Program (NFIP) and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets within the City that may be affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the City's existing building and infrastructure assets and insured values and are identified in detail in Tables H-6A, H- 6B, and H-7.

Tables H-8, H-9, and H-10 portray the City's critical infrastructure numbers and values, and their potential vulnerability by hazard type.

The City of Sheridan seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table H-6A were obtained from the 2000 U.S. Census and Portland State University. It comprises census block level data, and estimates from university conducted community research.

The City's existing building and infrastructure and insured values are identified in Tables H-6A, H-6B, and H-7.

Table H-6A. City of Sheridan Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census²	Total Building Count	Total Value of Buildings (\$)¹
3,570	5,785	5,865	1,364	153,782,529 ²

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$109,400 per structure).

² Portland State University (PSU) 2007 Oregon Population Report.

Table H-6B. City of Sheridan NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties²
Sheridan	338,952	489	525	75,368,400	645.62	52	761,088	1

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

²Content and building claims.

Table H-7. City of Sheridan Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Government	Sheridan City Hall	120 SW Mill St.	\$135,139.00
	Public Works Department	358 NW Washington St.	Unknown
	Sheridan Post Office	148 SE Harney St.	Unknown
	Other Sheridan Assets	Unknown	\$1,042,574.00
Emergency Response	City of Sheridan Fire Department	230 SW Mill St.	Unknown
	City of Sheridan Police Department		Unknown
Educational	Faulconer-Chapman School (K-8)	332 SW Cornwall St.	Unknown
	Sheridan High School (9-12)	433 S. Bridge St.	\$202,895.00
	Opportunity House (9-12)	437 S. Bridge St.	Unknown
	Sheridan Japanese School (4-12)	430 SW Monroe St.	Unknown
	The Delphian School (Private Boarding School [K-12])	20950 SW Rock Creek Road	Unknown
	West Valley Academy (1-12)	9015 DeJong Road, Sheridan	Unknown
Health Care	Sheridan Care Center (Intermediate Care)	411 SE Sheridan Rd.	Unknown
Community	Sheridan City Park	NE Yamhill St. by Blair St.	Unknown
	Edward R Moore Park		Unknown
	Municipal Pool ?		Unknown
	Sheridan Public Library	142 NW Yamhill St.	Unknown
	Greencrest Memorial Park (Cemetery)	108 NW Lincoln St.	Unknown
	Masonic Cemetery	At end NW Evans St.	Unknown
	William Savage House		Unknown
	Walter Sleepy House		Unknown
	Traveler's Home (formerly Savage-Mendenhall-Seth House)	147 NE Yamhill St.	Unknown
	Seventh-Day Adventist Church	940 W. Main St.	Unknown
	Church of the Nazarene	917 S. Bridge St.	\$35,309.00
	Open Door Community Church	339 NW Sheridan St.	\$136,510.00
	Good Shepherd Church	127 NE Hill St.	Unknown
	New Hope Christian Church	919 SW 2nd St.	Unknown
	First Christian Church	121 NE Yamhill St.	Unknown
	Trinity Lutheran Church	311 SE Schley St.	\$98,610.00
	Mennonite Church	240 SW Madison St.	Unknown
	Sheridan Methodist Church	234 N. Bridge St.	\$91,715.00
	Kingdom Hall of Jehovah's Witnesses	825 W. Main St.	\$32,918.00

Table H-7. City of Sheridan Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
	Baptist Church	643 E. Main St.	\$56,594.00
	Sheridan Sun Newspaper	147 NE Yamhill St.	Unknown
State and Federal Highways	State Highway 18	4 miles	
Railroads	Willamette & Pacific Railroad	2.75 miles	
Bridges	Sheridan Bride over the Sough Yamhill River Bridge		Unknown
Transportation Facilities- Listed as Utilities under Critical Facilities Folder	Sheridan Airport (small airport)	21821 SW Rock Cr Rd	Unknown
	Yamhill Community Action Program (handicapped and elderly)	800 NE 2nd St., McMinnville	Unknown
	Greyhound Bus Service		Unknown
	Taylor Lumber Site RR Spur	22100 SW Rock Creek Rd	Unknown
	Industrial Area RR Spur		Unknown
Utilities	South Yamhill River Water Supply & Treatment		Unknown
	Sheridan Area Waste Treatment Plant		Unknown
	United Telephone Co of the Northwest		Unknown
	Lift Station		Unknown

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is thoroughly discussed in the Yamhill County MHMP, Section 6, which generated the following Hazard Exposure Analysis Overviews. Tables H-8, H-9, and H-10 depict in tabular form results obtained from the GIS analysis depicted in hazard figures located in Appendix K.

Table H-8. City of Sheridan Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$)¹	Number	Value (\$)¹
Flood	Moderate	500-year floodplain	--	1050	114,870,000	10	unknown
	High	100-year floodplain	--	1029	112,572,600	10	unknown
Winter Storm		descriptive	5,785	1,364	149,221,600	10	unknown
Landslide	Moderate	14-32 degrees	--	599	65,530,600	2	unknown
	High	>32 degrees	--	100	10,940,000	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	1,116	122,090,400	10	unknown
	High	High fuel rank	--	883	96,600,200	10	unknown
	Very High	Very high fuel rank	--	281	30,741,400	1	unknown
	Extreme	Extreme fuel rank	--	--	--	--	--
Earthquake	Strong	9-20% (g)	5,785	1,364	149,221,600	10	unknown
	Very strong	>20-40% (g)	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--
Volcano		descriptive	5,785	1,364	149,221,600	10	unknown
Wind		descriptive	5,785	1,364	149,221,600	10	unknown
Drought		descriptive	--	--	--	--	--
Dam Failure	Significant	NID	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	--	--	--	--	--
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	940	102,836,000	10	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$109,400 per structure). Note-population by parcel was not available at the time this document was prepared. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed. 0.25 mile-buffered EHS sites were not calculated due to the use of census block level data.

Table H-9. City of Sheridan Potential Hazard Exposure Analysis Overview-Critical Facilities

			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--	5	35K
	High	100-year floodplain	3	135K	2	unknown	4	203K	1	unknown	16	452K
Winter Storm		descriptive	4	1.2M	2	unknown	6	203K	1	unknown	21	452K
Landslide	Moderate	14-32 degrees	--	--	--	--	1	unknown	--	--	4	134K
	High	>32 degrees	--	--	--	--	--	--	--	--	--	--
Wildland Fire	Moderate	Moderate fuel rank	3	135K	2	unknown	5	203K	1	unknown	17	452K
	High	High fuel rank	2	unknown	1	unknown	2	unknown	--	--	12	318K
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	2	57K
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	4	1.2M	2	unknown	6	203K	1	unknown	21	452K
Wind		descriptive	4	1.2M	2	unknown	6	203K	1	unknown	21	452K
Drought		descriptive	4	1.2M	2	unknown	6	203K	1	unknown	21	452K
Dam Failure		Inundation area	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	4	1.2M	2	unknown	6	203K	1	unknown	21	452K
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	3	135K	2	unknown	5	203K	1	unknown	16	452K
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	3	135K	2	unknown	6	203K	1	unknown	17	452K

Table H-10 City of Sheridan Potential Hazard Exposure Analysis Overview-Critical Infrastructure

			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$) ¹	Miles	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	--	--	--	--	--	--
	High	100-year floodplain	--	--	--	--	1	unknown	--	--	1	unknown	--	--
Winter Storm		descriptive	4	unknown	2.75	unknown	1	unknown	5	unknown	4	unknown	--	--
Landslide	Moderate	14-32 degrees	--	--	--	--	1	unknown	1	unknown	--	--	--	--
	High	>32 degrees	--	--	--	--	--	--	--	--	--	--	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	--	1	unknown	1	unknown	3	unknown	1	unknown	--	--
	High	High fuel rank	--	--	--	--	1	unknown	3	unknown	--	--	--	--
	Very High	Very high fuel rank	--	--	--	--	1	unknown	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	4	unknown	2.75	unknown	1	unknown	5	unknown	4	unknown	--	--
Wind		descriptive	4	unknown	2.75	unknown	1	unknown	5	unknown	4	unknown	--	--
Drought		descriptive	4	unknown	2.75	unknown	1	unknown	5	unknown	4	unknown	--	--
Dam Failure ⁽¹⁾		Inundation area	--	--	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	4	unknown	2.75	unknown	1	unknown	5	unknown	4	unknown	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	1	unknown	1	unknown	1	unknown	3	unknown	1	unknown	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	1	unknown	1	unknown	1	unknown	3	unknown	1	unknown	--	--

SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section describes each hazard and the community's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for the City of Sheridan. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In the City of Sheridan, 1,029 residential structures (value \$112.6M), ten non-residential structures (value unknown), three government facilities (value \$135K), two emergency response facilities (values unknown), four educational facilities (value \$203K), one care facility (value unknown), 16 community facilities (value \$452K), one bridge (value unknown), and one utility (value unknown) are located within the boundaries of the 100-year floodplain and therefore accorded a high flood risk.

The 500-year floodplain contains 1,050 residential structures (value \$114.9M), ten non-residential structures (value unknown) and five community facilities (value \$35K) with a moderate flood risk.

Winter Storm

Winter storms have widespread impacts that are most often the result of the ice, cold, high winds and flooding they bring. Damage to facilities and infrastructure can be severe, depending on the intensity of the storm event.

Since winter storms are regional events, the entire City of Sheridan can be equally affected. Therefore 5,785 residents, 1,364 residential structures (value \$149.2M), 10 non-residential structures (value unknown), four government facilities (value \$1.2M), two emergency response facilities (value unknown), six educational facilities (value \$203K), one care facility (value unknown), 21 community facilities (value \$452K), four highway segments (value unknown), 2.75 railroad segments (value unknown), one bridge (value unknown), five transportation facilities (value unknown), and four utilities (value unknown) are at risk.

Landslide

The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points.

Initial debris clearing from emergency routes and high traffic areas may be required. Water and waste water utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

USGS elevation datasets were used to determine the landslide hazard areas within the City of Sheridan. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, the City of Sheridan has 599 residential structures (value \$65.5M), two non-residential structures (value unknown), one educational facility (value unknown), four community facilities (value \$134K), one transportation facility (value unknown) and one bridge (value unknown) located in areas of moderate risk.

There are 100 residential structures (value \$10.9M) and no identified critical facilities located in areas of high risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

The City of Sheridan has critical facilities and infrastructure located within areas with moderate, high, and very high fuel ranks. Moderate fuel rank areas contain 1,116 residential structures (value \$122M), ten non-residential structures (value unknown), three government facilities (value \$135K), two emergency response facilities (value unknown), five educational facilities (value \$203K), one care facility (value unknown), 17 community facilities (value \$452K), one bridge (value unknown), three transportation facilities (value unknown), one railroad (value unknown), and one utility (value unknown).

High fuel rank areas contain 883 residential structures (value \$96.6M), ten non-residential structures (value unknown), two government facilities (value unknown), one emergency response facility (value unknown), two educational facilities (values unknown), 12 community facilities (value \$318K), three transportation facilities (value unknown), and one bridge (value unknown).

Very high fuel rank areas contain 281 residential structures (value \$30.7M), one non-residential structures (value unknown), two community facilities (value \$57K), and one bridge (value unknown).

Earthquake

Based on PGA shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas, however, is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable

slopes. As well as landslide, earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The City of Sheridan is in the eastern portion of Yamhill County, in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak acceleration of the ground caused by the earthquake, and for a strong designation corresponds to 9-20 percent of the acceleration of gravity.

The entire City of Sheridan can be equally affected by strong shaking earthquakes. Therefore 5,785 residents, 1,364 residential structures (value \$149.2M), 10 non-residential structures (value unknown), four government facilities (value \$1.2M), two emergency response facilities (value unknown), six educational facilities (value \$203K), one care facility (value unknown), 21 community facilities (value \$452K), four highway segments (value unknown), 2.75 railroad segments (value unknown), one bridge (value unknown), five transportation facilities (value unknown), and four utilities (value unknown) are at risk.

Volcano

As discussed in Chapter 5, volcanic activity is most likely to impact Yamhill County and the City of Sheridan in the form of ashfall or tephra. Damage is likely to result from volcanic eruption columns and clouds which contain volcanic gases, minerals, and rock. The columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat, and can distribute acid rain as sulfur dioxide gas mixes with water. Additionally, these particles can create a risk of suffocation as carbon dioxide is heavier than air and collects in valleys and depressions threatening human and animals. They further pose a toxic threat from fluorine which clings to ash particles potentially poisoning grazing livestock and contaminating domestic water supplies.

However, due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability, although it can be assumed that the entire population is equally at risk. This includes 5,785 residents, 1,364 residential structures (value \$149.2M), 10 non-residential structures (value unknown), four government facilities (value \$1.2M), two emergency response facilities (value unknown), six educational facilities (value \$203K), one care facility (value unknown), 21 community facilities (value \$452K), four highway segments (value unknown), 2.75 railroad segments (value unknown), one bridge (value unknown), five transportation facilities (value unknown), and four utilities (value unknown).

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Sheridan are equally at risk of a windstorm event. Therefore 5,785 residents, 1,364 residential structures (value \$149.2M), 10 non-residential structures (value unknown), four government facilities (value \$1.2M), two emergency response facilities (value unknown), six educational facilities (value \$203K), one care facility (value unknown), 21

community facilities (value \$452K), four highway segments (value unknown), 2.75 railroad segments (value unknown), one bridge (value unknown), five transportation facilities (value unknown), and four utilities (value unknown) are at risk.

Drought

State-wide droughts have historically occurred in Oregon, and as it is a region-wide phenomenon, all residents are equally at risk. Structural damage from drought is not expected; rather the risks apply to humans and resources. Industries important to the City of Sheridan's local economy such as agriculture, fishing, and timber have historically been affected, and any future droughts would have tangible economic and potentially human impacts.

Dam Failure

Dam inundation data is unavailable for Yamhill County, therefore it is not possible to assess the impacts due to dam failure in this region using that method. However, the City of Sheridan has done extensive research to determine the impacts of a dam failure at the Stony Mountain Impoundment Facility, located 10 miles outside of town.

The City of Sheridan's Stony Mountain Impoundment Facility is a spring-fed reservoir retained by a reinforced earthen dam with an emergency spillway that empties into La Toutena Mary Creek. The dam embankment, if breached, will spill into a La Toutena Mary Creek tributary, and the flood hydrograph will travel 3.37 miles to the La Toutena Mary Creek and East Creek confluence, with an additional 3.15 miles to East Creek's confluence with Willamina Creek. Based on a clear day piping failure stimulated by the City of Sheridan, if the dam embankment was breached, it would take approximately 35 minutes for the dammed water to travel the 3.37 miles to the East Creek confluence and an additional 100 minutes to travel to the Willamina Creek confluence.

Under normal conditions, the flood wave would start with approximately 10,670 cubic feet per second (cfs) at the dam and end with approximately 1,090 cfs at Willamina Creek. Due to the limited size of the watershed, the limited inflow to the reservoir, and the height of the dam compared to the emergency spillway (1,657 feet vs. 1,653 feet), an overtopping failure is unlikely. Thus, a catastrophic failure of the dam would not present a threat to human life downstream. Neither the road nor any residential structures would likely be inundated by the flood wave generated by a piping failure.

Even when the clear-day scenario was tested using more extreme assumptions, such as increased water levels, a dam failure still did not pose a threat to residential structures. Possible developments that could cause piping failure include rapid drawdown, seismic activity, or slope failure. As water flows through the dam, the passage could continue to grow as material is eroded away. Eventually the size of the passage could compromise the structural integrity of the dam and cause it to collapse. (City of Sheridan Dam Failure Analysis, 2007)

Disruption of Utility and Transportation Systems

Transportation system disruption impacts range from effects on life, health, and safety (in the form of emergency vehicle mobility, access to hospitals, access to evacuation routes, and access to vital supplies if transport is seriously disrupted for an extended period) to the economic effects

of delays, lost commerce, and lost time. Similarly, disruption of utility systems can affect Yamhill County and the City of Sheridan at the level of commerce and recreation as well as at the level of fundamental health and safety. Countywide and citywide disruptions are likely to impact all residents equally. Structural damage from disruption to these systems is not expected; rather the risks apply to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the EPA's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses that generate hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and all facilities within a 0.25 miles of a transportation route and an EHS site considered at risk.

There are 940 residential structures (value \$102.8M), ten non-residential structures (value unknown), three government facilities (value \$135K), two emergency response facilities (values unknown), five educational facilities (value \$203K), one care facility (value unknown), 16 community facilities (value \$452K), three transportation facilities, one highway, one railroad, one bridge, and one utility (values unknown) are located within the 0.25 mile risk area.

Three government facilities (value \$135K), two emergency response facilities (values unknown), six educational facilities (value \$203K), one care facility (value unknown), 17 community facilities (value \$452K), three transportation facilities, one highway, one railroad, one bridge, and one utility (values unknown) are within the 0.25 mile-buffered EHS zone.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County's mitigation goals listed in Table H-11, or to revise them to more fully meet the City's needs. The City then proceeded to evaluate potential mitigation actions after finalizing the mitigation goals.

Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Table H-12 depicts the City’s “considered” mitigation actions developed during this mitigation planning process. The revised list in Table H-14 delineates those actions the City will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction’s participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

The City of Sheridan actively participates in FEMA’s National Flood Insurance Program (NFIP) and have implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City’s Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties. They subsequently selected and prioritized City appropriate actions to assure an effective flood mitigation program.

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table H-11. 2006 Yamhill County Mitigation Goals-Considered	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

Table H-12. City of Sheridan Mitigation Actions Considered

Hazard	Status	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
MH	<i>Ongoing</i>		Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure above ground fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.
MH	<i>Ongoing</i>		Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	<i>Ongoing</i>		Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load and wind storm power line failure during severe wind or winter ice storm events.
MH	<i>Ongoing</i>		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	Consider		Install lightening rods and lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.
MH	<i>Ongoing</i>		Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
MH	<i>Ongoing</i>		Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.
MH	<i>Ongoing</i>		Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to acquire, relocate, elevate, and/or flood proof to protect the threatened population.
MH	<i>Ongoing</i>		Install storm shutters, hurricane clips, bracing systems etc. to meet or exceed applicable building codes while reducing disaster damages.
MH	<i>Ongoing</i>		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
MH	Consider		Develop vegetation projects to restore clear cut and riverine erosion damage and to increase landslide susceptible slope stability.

Table H-12. City of Sheridan Mitigation Actions Considered

Hazard	Status	Comment	Description
MH	<i>Ongoing</i>		Retrofit structures to protect them from seismic, floods, high winds, earthquakes, or other natural hazards.
MH	Consider		Acquire, demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.
MH	Consider		Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
MH	Consider		Establish a formal role for the jurisdictional Hazard Mitigation Planning Committees to develop a sustainable process to implement, monitor, and evaluate citywide mitigation actions.
MH	Consider		Identify and pursue funding opportunities to implement mitigation actions.
MH	Consider		Develop public and private sector partnerships to foster hazard mitigation activities.
MH	Ongoing		Integrate the Mitigation Plan findings into planning and regulatory documents and programs and into enhanced emergency planning.
Flood			
Flood	Consider		Work with the County's GIS staff to develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.
Flood	Consider		Work with the County's GIS staff to develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.
Flood	Consider		Work with the County's GIS staff to develop and maintain GIS mapped inventory of repetitive loss properties to include the types and numbers of properties.
Flood	Consider		Develop and implement mitigation actions for repetitive loss properties.
Flood	Consider		Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100-year floodplain using survey elevation data.
Flood	Consider		Implement mitigation measures identified by critical facilities' owners, and other facility owners, to protect facilities located within the 100-year floodplain.
Flood	Consider		Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current USACOE flood data.
Flood	Consider		Request DOGAMI debris flow and lahar data be included in FIRM updates. Use the updated FIRMS for land use and mitigation planning.
Flood	Consider		Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.
Flood	<i>Ongoing</i>		Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
Flood	<i>Ongoing</i>		Develop, implement, and enforce floodplain management ordinances.
Flood	Consider		Develop outreach program to educate residents concerning flood proofed water and sewer system installation.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof identified properties.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof critical facilities.
Flood	<i>Ongoing</i>		Install new streamflow and rainfall measuring gauges.

Table H-12. City of Sheridan Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	Ongoing		Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	Consider		Dry flood proof non-residential structures.
Flood	Consider		Dry flood proof historic structures.
Flood	Ongoing		Increase culvert size to increase its drainage efficiency.
Flood	Consider		Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
Flood	Consider		Construct debris deflectors to deflect the major portion of debris away from culvert entrances and bridge piers. They are normally "V" shaped.
Flood	Consider		Install debris fins upstream of a culvert to align debris so that the debris will pass through a drainage opening without clogging the inlet. They are sometimes used on bridge piers to deflect drifting materials.
Flood	Consider		Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.
Flood	Ongoing		Construct an emergency spillway at a dam or other structure to relieve excess water contained during high flow periods to reduce dam failure potential.
Flood	Consider		Construct floodwalls around the perimeter of a "facility" and extending above the highest flood elevation to keep floodwaters away from the facility. Floodwalls can be made from gabion baskets, concrete, large riprap, etc. Floodwalls should be used with caution as they can also act as a catchment preventing drainage away from the facility.
Flood	Consider		Install triangular or circular flow deflectors on or immediately upstream from bridge footings to deflect water flow and reduce flow velocities preventing footing scour.
Flood	Consider		Construct low water crossings in a road prism to carry flood flows from an intermittent drainage
Flood	Consider		Construct a high water overflow crossing to carry flood flows from over bank areas.
Flood	Consider		Create relief drainage ditch opening using a culvert, bridge, or multiple culverts; to relieve rapid water accumulation during high water flow events.
Flood	Consider		Modify existing culverts by developing a ring compression, by flattening, or beveling the end of a circular culvert to match the angle of the embankment. May need to install flanges to stiffen the beveled section of the culvert.
Flood	Consider		Construct spur dikes along the embankments to direct flood flows into a bridge opening or away from a continuous impact site.
Flood	Consider		Construct concrete wing walls at culvert or bridge entrances and outlets to direct water flow into their openings
Flood	Ongoing		Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
Flood	Ongoing		Develop and implement flood risk reduction program and outreach efforts considering upstream storage, channel improvements, and flood walls or levee construction.
Flood	Consider		Install dry-hydrants at strategic locations throughout community
Flood	Consider		Coordinate sewer lagoon overflow issues from Willamina sewage treatment plant
Flood	Consider		Upgrade protection to sewer pump stations
Flood	Consider		Upgrade protection to sewer plant and sewer plant emergency generators

Table H-12. City of Sheridan Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	Consider		Replace or retrofit force mains to protect river from waster water spillage
Flood	Consider		Improve sewer lagoon overflow protection from heavy rain
Flood	Consider		Mitigate inflow and infiltration into sanitary sewer main lines
Winter Storm (WS)			
Winter Storm	Consider		Develop and implement strategies and educational outreach programs for debris management from severe winter storms.
Winter Storm	Consider		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
Winter Storm	Consider		Update or develop, implement, and maintain jurisdictional debris management plans.
Winter Storm	<i>Ongoing</i>		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	Consider		Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.
Winter Storm	Consider		Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
Winter Storm	<i>Ongoing</i>		Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
Winter Storm	<i>Ongoing</i>		Develop personal use and educational outreach training for a “safe tree harvesting” program. Implement along utility and road corridors, preventing potential winter storm damage.
Winter Storm	<i>Ongoing</i>		Purchase NOAA Weather radios and develop a web portal linking residents to various weather information sites. (NWS, FEMA, The Weather Channel).
Winter Storm	Consider		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
Winter Storm	Consider		Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests.
Winter Storm	<i>Ongoing</i>		Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter Storm	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line severe wind or winter ice storm event failure.
Winter Storm	<i>Ongoing</i>		Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.
Landslide			
Landslide	Consider		Complete a landslide location inventory, identify threatened critical facilities and other buildings and infrastructure.
Landslide	Consider		Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.

Table H-12. City of Sheridan Mitigation Actions Considered

Hazard	Status	Comment	Description
Landslide	<i>Ongoing</i>		Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).
Landslide	<i>Ongoing</i>		Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
Landslide			Develop comprehensive geological landslide and rockslide prone area maps.
Landslide	<i>Ongoing</i>		Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.
Landslide	Consider		Develop, implement and enforce property development landslide risk assessment procedures to identify potential facility vulnerability.
Wildland Fire			
Wildland fire	Consider		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Wildland fire	Consider		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
Wildland fire	Consider		Develop Community Wildland Fire Protection Plans for all at-risk communities.
Wildland fire	Consider		Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
Wildland fire	Consider		Develop a plan to assist rural residents to evacuate through the city
Wildland fire	Consider		Provide wildland fire information in an easily distributed format for all residents.
Wildland fire	Consider		Schedule and perform government facility "fire drills" at least twice per year.
Wildland fire	<i>Ongoing</i>		Develop, adopt, and enforces burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.
Earthquake			
Earthquake	Consider		Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.
Earthquake	Consider		Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.
Earthquake	Consider		Identify high seismic hazard areas; develop a wood-frame residential building inventory and an outreach program to educate population concerning facilities particularly vulnerable to earthquake damage, such as pre-1940s homes and homes with cripple wall foundations.
Earthquake	Consider		Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Earthquake	Consider		Retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.
Earthquake	Consider		Work with the county and state Departments of Transportation to identify bridges that are not seismically adequate for lifeline transportation routes.
Earthquake	<i>Ongoing</i>		Update existing (or adopt the most current) Uniform Building Code
Earthquake	<i>Ongoing</i>		Implement and enforce the Uniform, International, and State Building Codes.
Earthquake	<i>Ongoing</i>		Inspect and/or certify all new construction.

Table H-12. City of Sheridan Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake	Consider		Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.
Earthquake	Consider		Develop outreach program to educate population concerning household, business, and public facility mitigation measures. For example, staff public information tables at fairs, safety events, and festivals.
Earthquake	Consider		Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
Earthquake	Consider		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.
Earthquake	Consider		Identify and prioritize a list of critical facilities with unreinforced masonry problems including non-structural projects such as brick chimney bracing or replacement, water heater bracing, and anchoring, etc.
Earthquake	Consider		Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.
Earthquake	Consider		Develop outreach program for educating private facilities concerning alternative or emergency power source acquisition to enable them to deliver food, fuel, and medical services during disaster emergency response and recovery efforts.
Earthquake	Consider		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Earthquake	Consider		Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.
Earthquake	Consider		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Volcano			
Volcano	Consider		Update public emergency notification procedures and develop an outreach program for ash fall events.
Volcano	Consider		Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.
Volcano	Consider		Evaluate capability of water treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.
Volcano	Consider		Evaluate ash impact on storm water drainage system and develop mitigation actions.
Wind			
Wind	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)
Wind	Consider		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.
Wind	<i>Ongoing</i>		Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.
Wind	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line failure during severe wind or winter ice storm events.
Expansive Soils			
Expansive Soils	<i>Ongoing</i>		Review construction codes to require non-absorbent fill soils that slope away from foundations for a minimum of five feet to prevent ponding and water retention.

Table H-12. City of Sheridan Mitigation Actions Considered

Hazard	Status	Comment	Description
Expansive Soils	<i>Ongoing</i>		Require building design, engineering, and construction processes that address expansive soil conditions at potentially affected building sites.
Expansive Soils	Consider		Plant trees a distance equal to their mature height away from a structure built on expansive soils. Minimum distance from foundation is 15 feet.
Expansive Soils	<i>Ongoing</i>		Require road design, engineering, and construction processes that address expansive soil conditions. Water absorption prevention, impermeable membrane, soil compaction, and drainage methods need to be considered once geologic studies determine soil composition.
Drought	Consider		Develop inventory of low moisture tolerant crops to reduce drought impact to agricultural lands. Promote outreach programs that address soil health and soil moisture preservation.
Drought			
Drought	Consider		Develop outreach agricultural programs that promote reducing topsoil loss during drought conditions and to encourage soil moisture level monitoring to help minimize crop loss.
Drought	Consider		Develop educational programs and initiatives related to water conservation and irrigation during drought periods.
Dam Failure			
Dam Failure	Consider		Prepare high resolution dam failure inundation area maps; use to update emergency response plans and public notification.
Dam Failure	Consider		Evaluate the adequacy of dike systems or holding ponds for both floods and earthquakes and implement mitigation measures as necessary.
Disruption of Utilities and Transportation Systems (DUTS)			
DUTS	Consider		Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.
DUTS	Consider		Review and update emergency response plans for utility disruptions.
DUTS	Consider		Review and update emergency response plans for transportation route disruptions.
DUTS	<i>Ongoing</i>		Identify and prioritize all “jurisdiction owned” & “non-jurisdiction owned” critical facilities that have backup power and emergency operations plans.
Hazardous Materials (HAZMAT)			
HAZMAT	<i>Ongoing</i>		Purchase backup power systems for all identified critical facilities.
HAZMAT	<i>Ongoing</i>		Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.
HAZMAT	<i>Ongoing</i>		Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.
HAZMAT	Consider		Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.
HAZMAT	Consider		Develop outreach program to educate the public regarding chemical hazards, safe handling, storage, and disposal procedures.
HAZMAT	Consider		Research, develop, and implement methods to protect waterways from hazardous materials events.
HAZMAT	Consider		Prepare a site-specific summary of hazardous materials used, stored, and commonly transported in the jurisdictional area.

Table H-12. City of Sheridan Mitigation Actions Considered

Hazard	Status	Comment	Description
			The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.
HAZMAT	Consider		Implement a business registration program with supplemental hazardous materials identification
HAZMAT	Consider		Upgrade physical security, detection, and response capability for critical facilities using information obtained from hazard assessments and risk analysis. Include water systems and any high-profile facilities such as jurisdiction water systems, sewer systems, electrical substations, major timber industry facilities, and sites with large quantities of hazardous substances (HS) and extremely hazardous substances (EHS).
HAZMAT	<i>Ongoing</i>		Develop an outreach program to educate residents to be alert to activities that could lead to a terrorist threat

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee evaluated and prioritized each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. The Committee then determined the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

The City of Sheridan Steering Committee evaluated the simplified STAPLEE evaluation criteria (shown below) and the Benefit-Cost Analysis Fact Sheet (Appendix P) for prioritizing its “considered” mitigation actions listed in Table H-12. The Steering Committee determined that the committee consisted of sufficient expertise to select those mitigation actions that would most benefit the City without using the STAPLE-E evaluation tool.

Upon review, the Steering Committee assigned a high priority ranking to actions that best fulfill the goals of the MHMP and are appropriate and feasible for the City and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined that only the existing and new mitigation actions that received a high priority ranking would be included in the countywide Mitigation Action Plan. Table H-14 depicts the City’s mitigation actions grouped by hazard and in descending priority order within each hazard.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

The City of Sheridan reviewed the Yamhill County goals and modified them to better suite the City's needs and subsequently adopted the Goals in Table H-13 for the current planning period.

Table H-13. City of Sheridan's Mitigation Goals	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
<ul style="list-style-type: none"> ■ Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? ■ Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? 	
Source: FEMA, July 2008.	

Table H-14 displays the City of Sheridan’s Mitigation Action Plan matrix that lists mitigation actions by hazard and are only prioritized within each hazard, not in total. Each mitigation action will be implemented and administered by the applicable managing department, agency, or responsible entity.

***Whenever TBD is used, it means that a benefit/cost analysis will be completed as a project is developed to validate the most appropriate mitigation action.*

Table H-14. City of Sheridan Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Natural Hazards						
<i>Multi-Hazard (MH)</i>						
MH	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Complete critical facility data collection to allow a more thorough vulnerability analysis for the City’s infrastructure.	Administration	1-5 years	General Fund	BC: TBD TF: Yes	
MH	Review ordinances and develop outreach programs to assure manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)	City Admin	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
MH	Review ordinances and develop outreach programs to assure above ground fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.	City Admin	Ongoing	General Fund, HMGP	BC: TBD** TF: Yes	
MH	Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	

Table H-14. City of Sheridan Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	City Admin/Public Works	Ongoing	General Fund, HMGP, HSGP	BC: TBD** TF: Yes	
MH	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.	City Admin	Ongoing	General Fund, HMGP, HMA, FMAP	BC: TBD** TF: Yes	
MH	Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to acquire, relocate, elevate, and/or flood proof to protect the threatened population.	City Admin	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
MH	Install storm shutters, hurricane clips, bracing systems etc. to meet or exceed applicable building codes while reducing disaster damages.	Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
MH	Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.	Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Retrofit structures to protect them from seismic, floods, high winds, earthquakes, or other natural hazards.	Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
MH	Integrate the Mitigation Plan findings into planning and regulatory documents and programs and into enhanced emergency planning.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	

Table H-14. City of Sheridan Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Flood						
Flood	Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.	City Admin	Ongoing	General Fund, HMA	BC: TBD** TF: Yes	
Flood	Install new streamflow and rainfall measuring gauges.	Public Works	Ongoing	General Fund, HMGP, HMA, NOAA/ NWS	BC: TBD** TF: Yes	
Flood	Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Flood	Increase culvert size to increase its drainage efficiency.	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
Flood	Construct an emergency spillway at a dam or other structure to relieve excess water contained during high flow periods to reduce dam failure potential.	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA, DMS	BC: TBD** TF: Yes	
Flood	Provide flood protection to mitigate damage and contamination of wastewater treatment systems.	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
Flood	Develop and implement flood risk reduction program and outreach efforts considering upstream storage, channel improvements, and flood walls or levee construction.	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	

Table H-14. City of Sheridan Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
<i>Winter Storm</i>						
Winter Storm	Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
Winter Storm	Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.	City Admin/Public Works, Utility Companies	Ongoing	General Fund, Utility Co	BC: TBD** TF: Yes	
Winter Storm	Develop personal use and educational outreach training for a “safe tree harvesting” program. Implement along utility and road corridors, preventing potential winter storm damage.	Public Works	Ongoing,	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
Winter Storm	Purchase NOAA Weather radios and develop a web portal linking residents to various weather information sites. (NWS, FEMA, The Weather Channel).	City Admin	Ongoing,	General Fund, NOAA/ NWS	BC: TBD** TF: Yes	
Winter Storm	Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Winter Storm	Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	
<i>Landslide</i>						
Landslide	Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
Landslide	Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.	City Admin/Public Works	Ongoing	General Fund, HMGP	BC: TBD** TF: Yes	

Table H-14. City of Sheridan Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Landslide	Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Wildland Fire						
Wildland Fire	Develop, adopt, and enforces burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.	City Admin/Fire District	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	
Earthquake						
Earthquake	Update existing (or adopt the most current) Uniform Building Code	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
Earthquake	Implement and enforce the Uniform, International, and State Building Codes.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Earthquake	Inspect and/or certify all new construction.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Wind						
Wind	Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	City Admin
Wind	Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	City Admin
Disruption of Utilities and Transportation Systems (DUTS)						
DUTS	Identify and prioritize all “jurisdiction owned” & “non-jurisdiction owned” critical facilities that have backup power and emergency operations plans.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	City Admin

Table H-14. City of Sheridan Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
HAZMAT						
HAZMAT	Purchase backup power systems for all identified critical facilities.	City Admin/Public Works	Ongoing	General Fund, HSGP	BC: TBD** TF: Yes	
HAZMAT	Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.	City Admin/Public Works/ District	Ongoing	General Fund, HSEP, CSEEP, CERCLA, SARA	BC: TBD** TF: Yes	
HAZMAT	Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.	City Admin/Public Works/Fire District	Ongoing	General Fund, HSEP, CSEEP, CERCLA, SARA	BC: TBD** TF: Yes	
HAZMAT	Develop an outreach program to educate residents to be alert to activities that could lead to a terrorist threat	City Admin/Public Works	Ongoing	General Fund, HSEP	BC: TBD** TF: Yes	

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Appendix I

City of Willamina

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This appendix contains specific City of Willamina information to support the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section supports the City of Willamina’s planning process by listing Steering Committee membership, documenting public outreach efforts, and summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan’s development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

The City of Willamina is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill that goal, the City organized a Hazard Mitigation Plan development Steering Committee dedicated to identifying hazard threats and developing actions that can be taken to mitigate damage and life losses from those threats.

Table I-1 contains the City's Steering Committee participant list to augment the Yamhill County MHMP planning elements.

Table I-1. City of Willamina Steering Committee	
Name	Agency/Department/Affiliation
Chris-Ann Harris	Office Coordinator
Jeff Brown	Public Works Superintendent
Charlene Brown	Museum Curator
Dave Morey	Fire Dept
Matt Reneiss	Fire Dept

Table I-2 contains the summary of the City's public involvement and planning meeting activities.

Table I-2. City of Willamina Public Involvement Mechanisms	
Mechanism	Description
Sheridan Sun Newsletter	Short article explaining the hazard mitigation plan development process- took info from newsletter
Local TV Station WAVE Broadband	Short announcement explaining the hazard mitigation plan development process- took info from newsletter
April Kickoff Newsletter	Distributed in utility bills. Explained plan development process and solicited input and comments.
August 15, 2008 Countywide Public Meeting, 10 a.m., 2 p.m., Yamhill County Public Works Auditorium, McMinnville, OR	Presented risk assessment results and provided opportunity to comment.
August 18, 2008 Countywide Public Meeting, 6 p.m., Yamhill County Public Works Auditorium, McMinnville, OR	Presented risk assessment results and provided opportunity to comment.

Table I– 3, I-4, and I-5 contain the City’s resources used to support planning activities.

Table I-3. City of Willamina Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Comprehensive Plan	Guides governance, development, land-use planning, and constructions requirements
	Transportation Plan	Guides transportation route development and identifies potential problem areas
	Emergency Response Plan	Delineates responsibilities during crisis events.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency. Describes known hazards
	Title 8.70 Hazardous Materials Releases	Provides procedure for coordination among various agencies in the event of hazardous materials releases. Describes known hazards
	Zoning Ordinance	Must comply with FEMA reg
	Development Codes	Provides guidance on development in hazard prone areas.

Table I-4. City of Willamina Administrative and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Council of Governments Marjorie Mattson-Planner (Contract)
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Yamhill County issues all permits in City limits, Streets and infrastructure use City of Salem Standards (automatically adopt any changes to standards for the City of Salem)
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	City Engineer-Dave Monson (can contract with specific expertise)
Floodplain manager	No
Personnel skilled in GIS and/or HAZUS-MH	Yamhill County for GIS
Director of Emergency Services	Yamhill County Sheriff and Fire Dept
Finance (grant writers, purchasing)	Council of Governments to help with grant writing
Public Information Officers	Chris Ann Harris; Sheriff and Fire Depts

Table I-5. City of Willamina Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	Very little
Authority to levy taxes for specific purposes	Yes with a vote of the people
Incur debt through general obligation bonds	Yes
Incur debt through special tax and revenue bonds	Yes
Incur debt through private activity bonds	No
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards	
Identifying Hazards	
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.	
Element	
■ Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	
Source: FEMA, July 2008.	

The City of Willamina’s Steering Committee determined that the following hazards could potentially threaten the community. Those hazards identified with an (*) are newly identified by the county as part of the update process – those identified with an (X) are specific to the City of Willamina.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	X
Wind	X
Erosion*	X
ENSO (El Niño / La Niña)*	
Expansive Soils*	
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	X
Disruption of Utility and Transportation Systems*	X
Hazardous Materials*	X
Terrorism*	X
Infectious Disease Epidemic*	

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for the City of Willamina to augment the MHMP development process. It comprises:

- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment]must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

The City of Willamina actively participates in FEMA's National Flood Insurance Program (NFIP) and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets within the City that may be affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the City's existing building and infrastructure assets and insured values and are identified in detail in Tables I-6A, I-6B, and I-7.

Tables I-8, I-9, and I-10 portray the City's critical infrastructure numbers and values, and their potential vulnerability by hazard type.

The City of Willamina seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table I-6A were obtained from the 2000 U.S. Census and Portland State University. It comprises census block level data, and estimates from university conducted community research.

The City's existing building and infrastructure and insured values are identified in Tables I-6A, I-6B, and I-7.

Table I-6A. City of Willamina Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census²	Total Building Count	Total Value of Buildings (\$)¹
1,844	1,860	1,885 (720 in Polk County, 1,165 in Yamhill County)	730	66,524,471 ²

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$100,600 per structure).

² Portland State University (PSU) 2007 Oregon Population Report.

Table I-6B. City of Willamina NFIP Insurance Report								
City of	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties²
Willamina	13,410	7	13	3,610,700	1,031.54	5	18,320	1

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

²Content and building claims.

(Note – many critical facilities and locations have been identified and included in this inventory and risk assessment – due to their confidential nature, locations have been “shaded” for publication. The data will remain in the report for the County’s future mitigation planning efforts)

Table I-7. City of Willamina Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Government	Willamina City Hall	411 NE C St	\$325,000
	Library	382 NE C St	\$458,000
	Courthouse	City Hall	see above
	Old PW Shop	250 NW Main	\$118,000
	New PW Shop/Offices	500 SE Adams	\$185,000
Emergency Response	Fire Station	825 NE Main	\$2.9 M
	Elementary & High School	1100 NE Oaken Hills Dr	\$19.3 M
	Middle/Junior High School	out of City	Unknown
	Vocational School	NA	Unknown
	Learning Center	NA	Unknown
	Charter School	NA	Unknown
	College/University	NA	Unknown
Care Facility	Hospital/Emergency Room	NA	Unknown
	Clinic at School	1100 NE Oaken Hills Dr	\$110,000
	Senior Center	340 NE B St	\$85,000
	Medical Office	149 NW 1st	\$175,000
	Retirement Facilities	NA	Unknown
Community	Museum	188 NE D St	\$275,000
	Tina Miller Park-YC	6701AC11900	Unknown
	Oaken Hills Park-YC	6701AD5200	Unknown
	Huddleston Park	600 NE Yamhill	\$700,000
	Garden Spot Park-YC	6701DB100	Unknown
	Lamson Park-YC	6701DB300	Unknown
	Cemetery-no address	Tax Lot-Polk Co. 671DC3800	Unknown
	Triangle Park-PC	671DC2800 & 2900	Unknown
State and Federal Highways	Main Street	State Hwy 18B	
Railroads	Willamette Pacific		
Bridges	State owned		

Table I-7. City of Willamina Critical Facilities and Infrastructure

Facility Type	Name / Number	Address	Value ¹
Transportation Facilities	Transportation-related facilities		None
Utilities	Water Treatment Facilities		\$2.34 M
	Telephone		owned by Embargo
	Wastewater Treatment Plant		\$4.8 mil
	Lift Station - YC		\$150,000
	Lift Station - YC		\$150,000
	Water Tank		included in water facilities
	Television		Unknown
	Landfill		Unknown
	Power Plant/Substations		Unknown

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

NA = Not Available.

Vulnerability Analysis

The vulnerability analysis development process is thoroughly discussed in the Yamhill County MHMP, Section 6, which generated the following Hazard Exposure Analysis Overviews. Tables I-8, I-9, and I-10 depict in tabular form results obtained from the GIS analysis depicted in hazard figures located in Appendix K.

Table I-8. City of Willamina Potential Hazard Exposure Analysis Overview-Population and Buildings

			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$) ¹	Number	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	29	2,917,400	--	--
	High	100-year floodplain	--	17	1,710,200	--	--
Winter Storm		descriptive	1,885	730	74,387,000	1	unknown
Landslide	Moderate	14-32 degrees	--	318	31,990,800	1	unknown
	High	>32 degrees	--	114	11,468,400	1	unknown
Wildland Fire	Moderate	Moderate fuel rank	--	395	39,737,000	1	unknown
	High	High fuel rank	--	308	30,984,800	1	unknown
	Very High	Very high fuel rank	--	195	19,617,000	1	unknown
	Extreme	Extreme fuel rank	--	--	--	--	--
Earthquake	Strong	9-20% (g)	1,885	730	74,387,000	1	unknown
	Very strong	>20-40% (g)	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--
Volcano		descriptive	1,885	730	74,387,000	1	unknown
Wind		descriptive	1,885	730	74,387,000	1	unknown
Erosion		descriptive	1,885	--	--	--	--
Drought		descriptive	--	--	--	--	--
Dam Failure ²	Significant	NID	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	1,885	--	--	--	--
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	349	35,109,400	1	unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--
Terrorism		descriptive	--	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$100,600 per structure). ² Dam inundation data is not available at this time. Note-population by parcel was not available at the time this document was prepared. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed.

Table I-9. City of Willamina Potential Hazard Exposure Analysis Overview-Critical Facilities												
			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	--	--	--	--	--	1	850K	4	975K
	High	100-year floodplain	--	--	--	--	--	--	--	--	4	975K
Winter Storm		descriptive	6	1.5M	3	2.9M	7	19.3M	5	370K	8	975K
Landslide	Moderate	14-32 degrees	4	901K	2	2.9M	1	19.3M	3	370K	4	975K
	High	>32 degrees	--	--	--	--	--	--	--	--	2	unknown
Wildland Fire	Moderate	Moderate fuel rank	6	1.3M	2	2.9M	2	19.3M	3	370K	5	975K
	High	High fuel rank	4	901K	2	2.9M	1	19.3M	3	370K	7	975K
	Very High	Very high fuel rank	--	--	1	2.9M	--	--	1	110K	3	275K
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	6	1.5M	3	2.9M	7	19.3M	5	370K	8	975K
Wind		descriptive	6	1.5M	3	2.9M	7	19.3M	5	370K	8	975K
Erosion		descriptive	--	--	--	--	--	--	--	--	1	700K
Drought		descriptive	6	1.5M	3	2.9M	7	19.3M	5	370K	8	975K
Dam Failure ²	Significant	NID	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	6	1.5M	3	2.9M	7	19.3M	5	370K	8	975K
Hazardous Material Event	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	5	1.1M	2	2.9M	2	19.3M	3	370K	7	975K
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	5	1.1M	2	2.9M	1	unknown	1	85K	7	975K
Terrorism		descriptive	6	1.5M	3	2.9M	7	19.3M	5	370K	8	975K

1 – values for all facilities may not be available.
2 – dam inundation data is not available at this time.

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Table I-10. City of Willamina Potential Hazard Exposure Analysis Overview-Critical Infrastructure														
			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$) ¹	Miles	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹	No.	Value (\$) ¹
Flood	Moderate	500-year floodplain	--	--	--	--	1	unknown	--	--	--	--	--	--
	High	100-year floodplain	--	--	--	--	1	unknown	--	--	--	--	--	--
Winter Storm		descriptive	1 unknown	unknown	1 unknown	unknown	1	unknown	--	--	9	7.44M	--	--
Landslide	Moderate	14-32 degrees	--	--	--	--	1	unknown	--	--	3	2.3M	--	--
	High	>32 degrees	--	--	--	--	1	unknown	--	--	--	--	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	1	unknown	--	--	5	11.9M	--	--
	High	High fuel rank	--	--	--	--	1	unknown	--	--	3	2.3M	--	--
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Volcano		descriptive	1 unknown	unknown	1 unknown	unknown	1	unknown	--	--	9	7.44M	--	--
Wind		descriptive	1 unknown	unknown	1 unknown	unknown	1	unknown	--	--	9	7.44M	--	--
Erosion		descriptive	--	--	--	--	--	--	--	--	--	--	--	--
Drought		descriptive	1 unknown	unknown	1 unknown	unknown	1	unknown	--	--	9	7.44M	--	--
Dam Failure ⁽¹⁾	Significant	NID	--	--	--	--	--	--	--	--	--	--	--	--
Disruption of Utility and Transportation Systems		descriptive	1 unknown	unknown	1 unknown	unknown	1	unknown	--	--	9	7.44M	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	--	--	--	1	unknown	--	--	4	7.1M	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	1	unknown	--	--	2	4.8M	--	--
Terrorism		descriptive	1 unknown	unknown	1 unknown	unknown	1	unknown	--	--	9	7.44M	--	--

1 – values for all facilities may not be available.

2 – dam inundation data is not available at this time.

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SUMMARY OF VULNERABILITIES AND IMPACTS TO IDENTIFIED HAZARDS

The following section describes each hazard and the community's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for the City of Willamina. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In the City of Willamina, 17 residential structures (value \$1.7M), four community facilities (value \$975K), and one bridge (value unknown) is located within the boundaries of the 100-year floodplain and therefore accorded a high flood risk.

There are 29 residential structures (value \$2.9M), one care facility (value \$850K), four community facilities (value \$975K), and one bridge (value unknown) are located within the 500-year floodplain and accorded a moderate flood risk.

Winter Storm

Winter storms have widespread impacts that are most often the result of the ice, cold, high winds and flooding they bring. Damage to facilities and infrastructure can be severe, depending on the intensity of the storm event.

Since winter storms are regional events, the entire City of Willamina can be equally affected. This includes 1,885 residents, 730 residential structures (value \$74.4M), one non-residential structure (value unknown), six government facilities (value \$1.5M), three emergency response facilities (value \$2.9M), seven educational facilities (value \$19.3M), five care facilities (value \$370K), eight community facilities (value \$975K), nine utilities, one highway segment, one rail segment, and one bridge (values unknown) are at risk.

Landslide

The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and waste water utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

USGS elevation datasets were used to determine the landslide hazard areas within the City of Willamina. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, the City of Willamina has 318 residential structures (value \$31.9M), one non-residential structure (value unknown), four government facilities (value \$901K), two emergency response facilities (value \$2.9M), three care facilities (value \$370K), one educational facility (value \$19.3M), four community facilities (value \$975K), one bridge (value unknown), and three utilities (value \$2.3M) located in areas of moderate risk.

There are 114 residential structures (value \$11.5M), one non-residential structure (value unknown), two community facilities (value unknown) and one bridge (value unknown) located within areas of high risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

The City of Willamina has critical facilities and infrastructure located within areas with moderate, high, and very high fuel rankings. Areas of moderate fuel rank contain 395 residential structures (value \$39.7M), one non-residential structures (value unknown), six government facilities (value \$1.3M), two emergency response facilities (value \$2.9M), three care facilities (value \$370K), two educational facilities (value \$19.3M), five community facilities (value \$975K), one bridge (value unknown), and five utilities (value \$11.9M).

Areas of high fuel rank contain 308 residential structures (value \$30.9M), one non-residential structure (value unknown), four government facilities (value \$901K), two emergency response facilities (value \$2.9M), three care facilities (value \$370K), one educational facility (value \$19.3M), seven community facilities (value \$975K), one bridge (value unknown), and three utilities (value \$2.3M).

Areas of very high fuel rank contain 195 residential structures (value \$19.6M), one non-residential structure (value unknown), one emergency response facility (value \$2.9M), one care facility (value \$110K), one educational facility (value \$19.3M), and three community facilities (value \$275K).

Earthquake

Based on PGA shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas, however, is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable slopes. As well as landslide, earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

The City of Willamina is in the eastern portion of Yamhill County, in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak acceleration of the ground caused by the earthquake, and for a strong designation corresponds to 9-20 percent of the acceleration of gravity.

The entire City of Willamina can be equally affected by earthquakes. This includes 1,885 residents, 730 residential structures (value \$74.4M), one non-residential structure (value unknown), six government facilities (value \$1.5M), three emergency response facilities (value \$2.9M), seven educational facilities (value \$19.3M), five care facilities (value \$370K), eight community facilities (value \$975K), nine utilities, one highway segment, one rail segment, and one bridge (values unknown) at risk to a strong shaking earthquake.

Volcano

As discussed in Chapter 5, volcanic activity is most likely to impact Yamhill County and the City of Willamina in the form of ashfall or tephra. Damage is likely to result from volcanic eruption columns and clouds which contain volcanic gases, minerals, and rock. The columns and clouds form rapidly and extend several miles above an eruption. Solid particles within the clouds present a serious aviation threat, and can distribute acid rain as sulfur dioxide gas mixes with water. Additionally, these particles can create a risk of suffocation as carbon dioxide is heavier than air and collects in valleys and depressions threatening human and animals. They further pose a toxic threat from fluorine which clings to ash particles potentially poisoning grazing livestock and contaminating domestic water supplies.

However, due to the nature of the hazard, it is impossible to predict the location or extent of future events with any probability, although it can be assumed that all 1,885 residents, 730 residential structures (value \$74.4M), one non-residential structure (value unknown), six government facilities (value \$1.5M), three emergency response facilities (value \$2.9M), seven educational facilities (value \$19.3M), five care facilities (value \$370K), eight community facilities (value \$975K), nine utilities, one highway segment, one rail segment, and one bridge (values unknown) are at risk.

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within the City of Willamina are equally at risk of a windstorm event. This includes 1,885 residents, 730 residential structures (value \$74.4M), one non-residential structure (value unknown), six government facilities (value \$1.5M), three emergency response facilities (value \$2.9M), seven educational facilities (value \$19.3M), five care facilities (value \$370K), eight community facilities (value \$975K), nine utilities, one highway segment, one rail segment, and one bridge (values unknown) are at risk.

Erosion

Riverine erosion rarely causes death or injury. However, erosion causes significant destruction of property, development, and infrastructure. Erosion hazard data is not readily available; however, descriptions of several localized areas were identified during the development of this document and are identified only by location on a map referencing the river or stream reach described. Critical facilities that may be at risk of erosion were identified using a 300 foot-buffer in the areas identified as having historic erosion impacts to conservatively account for building footprints.

One community facility (value \$700K) was identified in the City of Willamina to be at risk from erosion impacts.

Drought

State-wide droughts have historically occurred in Oregon, and as it is a region-wide phenomenon, all residents are equally at risk. Structural damage from drought is not expected; rather the risks apply to humans and resources. Industries important to the City of Willamina's local economy such as agriculture, fishing, and timber have historically been affected, and any future droughts would have tangible economic and potentially human impacts.

Dam Failure

Dam inundation data is unavailable for Yamhill County, therefore it is not possible to assess the impacts due to dam failure in this region using that method. However, as determined by the Army Corps of Engineers and summarized in the National Inventory of Dams, The City of Willamina Dam poses a significant hazard to the City of Willamina in the instance of failure.

The City of Willamina Dam is an earthen dam located approximately 12 miles north of town. It is expected that a dam failure would affect the city by causing a mud flow down Willamina Creek. There is also a moderate concern of debris flowing down the Willamina Creek in the case of a dam failure of the City of Sheridan's Stony Mountain Impoundment Facility. (City of Willamina Hazard Profile)

Disruption of Utility and Transportation Systems

Transportation system disruption impacts range from effects on life, health, and safety (in the form of emergency vehicle mobility, access to hospitals, access to evacuation routes, and access to vital supplies if transport is seriously disrupted for an extended period) to the economic effects of delays, lost commerce, and lost time. Similarly, disruption of utility systems can affect Yamhill County and the City of Willamina at the level of commerce and recreation as well as at the level of fundamental health and safety. Countywide and citywide disruptions are likely to impact all residents equally. Structural damage from disruption to these systems is not expected; rather the risks apply to residents and those traveling in the area.

Hazardous Material Event

The National Response Center and the EPA's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses that generate hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and

all facilities within 0.25 miles of a transportation route or from and EHS site are considered at risk.

In the City of Willamina, 349 residential structures (value \$35.1M), one non-residential structure (value unknown), five government facilities (value \$1.1M) two emergency response facilities (value \$2.9M), three care facilities (value \$370K) two educational facilities (value \$19.3M), seven community facilities (value \$975K), one bridge (value unknown), and four utilities (value \$7.1M) are considered at risk as they are within the 0.25 mile risk area.

Five government facilities (value \$1.1M) two emergency response facilities (value \$2.9M), one care facility (value \$85K) one educational facility (value unknown), seven community facilities (value \$975K), one bridge (value unknown), and two utilities (value \$4.8M) are within the 0.25 mile-buffered EHS zone.

Terrorism

It is difficult to determine the scope of any terrorist threat to the City of Willamina. Although there seem to be few high-profile targets present, it is impossible to predict future terrorist events. Depending on the extent of the action, the community may suffer economic loss, disruption of utilities, and cleanup relating to explosions and other facility damages. All facilities and residents are at equal risk of being impacted by this threat.

MITIGATION STRATEGY

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County's mitigation goals listed in Table I-11, or to revise them to more fully meet the City's needs. The City then proceeded to evaluate potential mitigation actions after finalizing the mitigation goals.

Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Table I-12 depicts the City's "considered" mitigation actions developed during this

mitigation planning process. The revised list in Table I-14 delineates those actions the City will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance	
National Flood Insurance Program (NFIP) Compliance	
Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.	
Element	
<ul style="list-style-type: none"> ■ Does the new or updated plan describe the jurisdiction(s) participation in the NFIP? ■ Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP? 	
Source: FEMA, July 2008.	

The City of Willamina actively participates in FEMA's National Flood Insurance Program (NFIP) and have implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties. They subsequently selected and prioritized City appropriate actions to assure an effective flood mitigation program.

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table I-11. 2006 Yamhill County Mitigation Goals-Considered	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

Table I-12. City of Willamina Mitigation Actions Considered

Hazard	Status	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
MH	<i>Ongoing</i>		Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.
MH	Consider		Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	<i>Ongoing</i>		Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	Consider		Relocate power lines to underground to reduce power line failure during severe wind or winter ice storm events.
MH	<i>Ongoing</i>		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	<i>Ongoing</i>		Install lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.
MH	Consider		Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
MH	<i>Ongoing</i>		Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.
MH	<i>Ongoing</i>		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.
MH	Consider		Retrofit structures to protect them from seismic, floods, high winds, earthquakes, or other natural hazards.
MH	Consider		Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
MH	Consider		Establish a formal role for the jurisdictional Hazard Mitigation Planning Committees to develop a sustainable process to implement, monitor, and evaluate citywide mitigation actions.
MH	Consider		Identify and pursue funding opportunities to implement mitigation actions.
MH	<i>Ongoing</i>		Develop public and private sector partnerships to foster hazard mitigation activities.

Table I-12. City of Willamina Mitigation Actions Considered

Hazard	Status	Comment	Description
MH	Consider		Integrate the Mitigation Plan findings into planning and regulatory documents and programs and into enhanced emergency planning.
Flood			
Flood	<i>Ongoing</i>		Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.
Flood	Consider		Develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.
Flood	Consider		Implement mitigation measures identified by critical facilities' owners, and other facility owners, to protect facilities located within the 100-year floodplain.
Flood	Consider		Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current USACOE flood data.
Flood	Consider		Request DOGAMI debris flow and lahar data be included in FIRM updates. Use the updated FIRMS for land use and mitigation planning.
Flood	<i>Ongoing</i>		Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.
Flood	Consider		Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
Flood	<i>Ongoing</i>		Develop, implement, and enforce floodplain management ordinances.
Flood	Consider		Install new streamflow and rainfall measuring gauges.
Flood	<i>Ongoing</i>		Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	Consider		Increase culvert size to increase its drainage efficiency.
Flood	Consider		Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
Flood	<i>Ongoing</i>		Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.
Flood	Consider		Create relief drainage ditch opening using a culvert, bridge, or multiple culverts; to relieve rapid water accumulation during high water flow events. .
Flood	Consider		Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
Flood	Consider		Develop and implement flood risk reduction program and outreach efforts considering upstream storage, channel improvements, and flood walls or levee construction.
Winter Storm			
Winter Storm	<i>Ongoing</i>		Develop and implement strategies and educational outreach programs for debris management from severe winter storms.
Winter Storm	Consider		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.

Table I-12. City of Willamina Mitigation Actions Considered

Hazard	Status	Comment	Description
Winter Storm	Consider		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	Consider		Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.
Winter Storm	Ongoing		Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
Winter Storm	Consider		Purchase NOAA Weather radios and develop a web portal linking residents to various weather information sites. (NWS, FEMA, The Weather Channel).
Winter Storm	Consider		Install new streamflow and precipitation measuring gauges and develop monitoring and early warning program.
Winter Storm	Consider		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
Winter Storm	Consider		Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests. Develop Reverse Notification System with the county.
Winter Storm	Ongoing		Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter Storm	Consider		Relocate power lines to underground to reduce power line failure during severe wind or winter ice storm events.
Wildland Fire			
Wildland Fire	Ongoing		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Wildland Fire	Consider		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
Wildland Fire	Ongoing		Develop Community Wildland Fire Protection Plans for all at-risk communities.
Wildland Fire	Ongoing		Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
Wildland Fire	Ongoing		Promote FireWise building siting, design, and construction materials.
Wildland Fire	Ongoing		Develop FireWise Public Service Announcements (PSA).
Wildland Fire	Ongoing		Provide wildland fire information in an easily distributed format for all residents.
Wildland Fire	Consider		Conduct residential audits for wildland and building fire hazard identification then develop an outreach program to convey the findings.
Wildland Fire	Ongoing		Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.
Wildland Fire	Consider		Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high risk areas.
Wildland Fire	Consider		Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.
Wildland Fire	Consider		Identify, develop, and implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.

Table I-12. City of Willamina Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake			
Earthquake	Consider		Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.
Earthquake	Consider		Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Earthquake	Ongoing		Update existing (or adopt the most current) Uniform Building Code
Earthquake	Ongoing		Implement and enforce the Uniform, International, and State Building Codes.
Earthquake	Ongoing		Inspect and/or certify all new construction.
Earthquake	Consider		Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.
Earthquake	Consider		Develop outreach program to educate population concerning household, business, and public facility mitigation measures. For example, staff public information tables at fairs, safety events, and festivals.
Earthquake	Ongoing		Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.
Earthquake	Consider		Inspect and prioritize any critical facility or public infrastructure that does not meet current Building Codes.
Earthquake	Consider		Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, and electric power systems, within the jurisdiction.
Earthquake	Ongoing		Develop outreach program for educating private facilities concerning alternative or emergency power source acquisition to enable them to deliver food, fuel, and medical services during disaster emergency response and recovery efforts.
Earthquake	Ongoing		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Earthquake	Ongoing		Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.
Volcano			
Volcano	Ongoing		Update public emergency notification procedures and develop an outreach program for ash fall events.
Volcano	Ongoing		Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.
Volcano	Ongoing		Evaluate capability of water treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.
Volcano	Ongoing		Evaluate ash impact on storm water drainage system and develop mitigation actions.
Wind			
Wind	Ongoing		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)
Wind	Ongoing		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption

Table I-12. City of Willamina Mitigation Actions Considered

Hazard	Status	Comment	Description
			from wind storm / tree blow down damage.
Wind	Consider		Relocate power lines to underground to reduce power line failure during severe wind or winter ice storm events
Erosion			
Erosion	Consider		Maintain and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat.
Erosion	Consider		Apply for grants/funds to implement riverbank protection methods.
Erosion	Consider		Develop and provide information to all residents on riverbank erosion and methods to prevent it in an easily distributed format
Erosion	Consider		Install riverbank erosion protection measures as needed and determined by a qualified engineer.
Drought			
Drought	Consider		Develop educational programs and initiatives related to water conservation and irrigation during drought periods.
Dam Failure			
Dam Failure	Consider		Prepare high resolution dam failure inundation area maps; use to update emergency response plans, evacuation route identification, public notification, and evacuation procedures
Disruption of Utility and Transportation Systems (DUTS)			
DUTS	Consider		Develop outreach program to educate and encourage residents to maintain several days of emergency supplies for power outages or road closures.
DUTS	Consider		Review and update emergency response plans for utility disruptions.
DUTS	Consider		Review and update emergency response plans for transportation route disruptions.
DUTS	Consider		Identify and prioritize all “jurisdiction owned” & “non-jurisdiction owned” critical facilities that have backup power and emergency operations plans.
DUTS	Consider		Purchase backup power systems for all identified critical facilities.
Hazardous Materials (HAZMAT)			
HAZMAT	<i>Ongoing</i>		Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.
HAZMAT	<i>Ongoing</i>		Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.
HAZMAT	<i>Ongoing</i>		Evaluate existing security measures for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS) and enhance security as necessary.
HAZMAT	<i>Ongoing</i>		Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.
HAZMAT	Consider		Develop outreach program to educate the public regarding chemical hazards, safe handling, storage, and disposal procedures.
HAZMAT	<i>Ongoing</i>		Research, develop, and implement methods to protect waterways from hazardous materials events.
HAZMAT	<i>Ongoing</i>		Prepare a site-specific summary of hazardous materials used, stored, and commonly transported in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency

Table I-12. City of Willamina Mitigation Actions Considered

Hazard	Status	Comment	Description
			response protocols, and mitigation actions.
Terrorism			
Terrorism	<i>Ongoing</i>		Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.
Terrorism	Consider		Upgrade physical security, detection, and response capability for critical facilities using information obtained from hazard assessments and risk analysis. Include water systems and any high-profile facilities such as major timber industry facilities and sites with large quantities of hazardous substances (HS) and extremely hazardous substances (EHS).

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met on June 27, 2008 to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. The Committee then met on August 5, 2008 to determine the responsible agency and potential funding sources. The Mitigation Action Plan represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

The City of Willamina Steering Committee evaluated the Benefit-Cost Analysis Fact Sheet (Appendix P) for prioritizing its “considered” mitigation actions listed in Table I-12. Upon review, the Steering Committee assigned a high priority ranking to actions that best fulfill the goals of the HMP and are appropriate and feasible for the City and responsible entities to implement during the 5-year lifespan of this version of the HMP. As such, the Steering Committee determined that only the existing and new mitigation actions that received a high priority ranking would be included in the countywide Mitigation Action Plan. Table I-14 depicts the City’s mitigation actions grouped by hazard and in descending priority order within each hazard.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

The City of Willamina reviewed the Yamhill County goals, determined they meet the City's needs, and subsequently implemented the Goals in Table I-13 for the current planning period.

Table I-13. City of Willamina Mitigation Goals	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
<ul style="list-style-type: none"> ■ Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? ■ Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? 	
Source: FEMA, July 2008.	

Table I-14 displays the City of Willamina’s Mitigation Action Plan matrix that lists mitigation actions by hazard and are only prioritized within each hazard, not in total. Each mitigation action will be implemented and administered by the applicable managing department, agency, or responsible entity.

***Whenever TBD is used, it means that a benefit/cost analysis will be completed as a project is developed to validate the most appropriate mitigation action.*

Table I-14. City of Willamina Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Natural Hazards						
Multi-Hazard (MH)						
MH	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Review ordinances and develop outreach programs to assure manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Review ordinances and develop outreach programs to assure fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	

Table I-14. City of Willamina Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
MH	Install lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
MH	Develop public and private sector partnerships to foster hazard mitigation activities.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
Flood						
Flood	Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Flood	Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.	City Admin/Public Works	Ongoing	General Fund, HMGP, PDM, FMA	BC: TBD** TF: Yes	
Flood	Develop, implement, and enforce floodplain management ordinances.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
Flood	Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	

Table I-14. City of Willamina Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Flood	Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.	City Admin/Public Works	Ongoing	General Fund, HMGP, PDM, NRCS	BC: TBD** TF: Yes	
Winter Storm						
Winter Storm	Develop and implement strategies and educational outreach programs for debris management from severe winter storms.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Winter Storm	Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.	City Admin/Public Works	Ongoing	General Fund, HMGP, PDM	BC: TBD** TF: Yes	
Winter Storm	Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Wildland Fire						
Wildland Fire	Identify critical facilities and vulnerable populations based on mapped high hazard areas.	City Admin/Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	
Wildland Fire	Develop Community Wildland Fire Protection Plan	City Admin/Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	
Wildland Fire	Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.	Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	
Wildland Fire	Promote FireWise building siting, design, and construction materials.	Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	

Table I-14. City of Willamina Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Wildland Fire	Develop FireWise Public Service Announcements (PSA).	Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	
Wildland Fire	Provide wildland fire information in an easily distributed format for all residents.	Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	
Wildland Fire	Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.	City Admin/Fire Dept	Ongoing	General Fund, FMAP	BC: TBD** TF: Yes	
Earthquake (EQ)						
EQ	Update existing (or adopt the most current) Uniform Building Code	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
EQ	Implement and enforce the Uniform, International, and State Building Codes.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
EQ	Inspect and/or certify all new construction.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
EQ	Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.	City Admin	Ongoing	General Fund, HMGP	BC: TBD** TF: Yes	
EQ	Develop outreach program for educating private facilities concerning alternative or emergency power source acquisition to enable them to deliver food, fuel, and medical services during disaster emergency response and recovery efforts.	City Admin/Public Works	Ongoing	General fund	BC: TBD** TF: Yes	
EQ	Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	

Table I-14. City of Willamina Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
<i>Volcano</i>						
Volcano	Update public emergency notification procedures and develop an outreach program for ash fall events.	City Admin/Public Works/Fire Dept/Police	Ongoing	General Fund, NOAA/ NWS, HSGP	BC: TBD** TF: Yes	
Volcano	Update emergency response planning and develop client focused outreach program for ash fall events affecting river, air, and highway transportation, and industrial facilities and operations.	City Admin/Public Works	Ongoing	General Fund, NOAA/ NWS, HSGP	BC: TBD** TF: Yes	
Volcano	Evaluate capability of water treatment plants to deal with high turbidity from ash falls, update emergency response plans, and upgrade treatment facilities' physical plant to deal with ash falls. Prioritize and initiate actions to fill capability gaps.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
Volcano	Evaluate ash impact on storm water drainage system and develop mitigation actions.	City Admin/Public Works	Ongoing	General Fund	BC: TBD** TF: Yes	
<i>Wind</i>						
Wind	Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)	City Admin	Ongoing	General Fund	BC: TBD** TF: Yes	
Wind	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.	City Admin/Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD** TF: Yes	

Table I-14. City of Willamina Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Hazardous Materials (HAZMAT)						
HAZMAT	Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.	City Admin, Public Works, Fire Dept	Ongoing	General Fund, CERCLA, SARA, EPA	BC: TBD** TF: Yes	
HAZMAT	Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.	City Admin, Public Works, Fire Dept	Ongoing	General Fund, CERCLA, SARA, EPA, HSGP	BC: TBD** TF: Yes	
HAZMAT	Evaluate existing security measures for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS) and enhance security as necessary.	City Admin, Public Works, Fire Dept	Ongoing	General Fund, HSGP, EPA	BC: TBD** TF: Yes	
HAZMAT	Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.	City Admin, Public Works, Fire Dept	Ongoing	General Fund, HSGP, EPA	BC: TBD** TF: Yes	
HAZMAT	Research, develop, and implement methods to protect waterways from hazardous materials events.	City Admin, Public Works, Fire Dept	Ongoing	General Fund, CERCLA, SARA, EPA, HSGP	BC: TBD** TF: Yes	
HAZMAT	Prepare a site-specific summary of hazardous materials used, stored, and commonly transported in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.	City Admin, Public Works, Fire Dept	Ongoing	General Fund	BC: TBD** TF: Yes	

Table I-14. City of Willamina Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit- Costs / Technical Feasibility	Comments
Terrorism						
Terrorism	Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.	City Admin, Police, Fire Dept	Ongoing	General Fund, HSGP	BC: TBD** TF: Yes	

Appendix J

Yamhill City

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This appendix contains specific Yamhill City information to support the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan update.

This section supports Yamhill City's planning process by listing Steering Committee membership, documenting public outreach efforts, and summarizing the review and incorporation of existing plans, studies, and reports used to develop this MHMP.

DMA 2000 Requirements: Planning Process

Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.

Element

- Does the new or updated plan describe how each jurisdiction participated in the plan's development?
- Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?

Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?

Source: FEMA, July 2008.

Yamhill City is dedicated to mitigating potential natural and technological hazard threats to its population and infrastructure. To fulfill that goal, the City organized a Hazard Mitigation Plan development Steering Committee dedicated to identifying hazard threats and developing actions that can be taken to mitigate damage and life losses from those threats.

Table J-1 contains the City's Steering Committee participant list to augment the Yamhill County MHMP planning elements.

Table J-1. Yamhill City Steering Committee	
Name	Agency/Department/Affiliation
Richard A. Howard Sr.	Public Works Superintendent
Randy Murphy	Mayor
Paula Terp	City Councilor
Mel Jordan	City Councilor
Kay Echauri	City Councilor
Stan Vocha	Planning Department
Robert Headrick	Planning Department
Jay Disbrow	Citizen
Floyd Kanope	Citizen

Table J-2 contains the summary of the City's public involvement and planning meeting activities.

Table J-2. Yamhill City Public Involvement Mechanisms	
Mechanism	Description
April Kickoff Newsletter	Explained plan development process and solicited input and comments.
August 15, 2008 Countywide Public Meeting, 10 a.m., 2 p.m., Yamhill County Public Works Auditorium, McMinnville, OR	Presented risk assessment results and provided opportunity to comment.
August 18, 2008 Countywide Public Meeting, 6 p.m., Yamhill County Public Works Auditorium, McMinnville, OR	Presented risk assessment results and provided opportunity to comment.
Committee Meeting, November 5, 2008	Discussed the Appendix Draft, selected and prioritized mitigation actions to implement

CAPABILITY ASSESSMENT

Table J-3, J-4, and J-5 contain the City's resources used to support planning activities

Table J-3. Yamhill City Legal and Regulatory Resources Available for Hazard Mitigation		
Regulatory Tool	Name	Effect on Hazard Mitigation
Plans	Comprehensive Plan	To guide governance and regulate land-use and development within the City
	Transportation Plan	To guide and ensure transportation infrastructure development complies with City requirements.
	City Charter	To provide for the government of Yamhill City, Yamhill County, Oregon; and to repeal all charter provisions of the city enacted prior to the time that this charter takes effect.
Programs	National Flood Insurance Program (NFIP)	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods.
Policies (Municipal Codes)	Title 7 Emergency Organization and Functions	Provides for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency. Describes known hazards
	Title 8.70 Hazardous Materials Releases	Provides procedure for coordination among various agencies in the event of hazardous materials releases. Describes known hazards

Table J-3. Yamhill City Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Name	Effect on Hazard Mitigation
Policies (Municipal Codes)	Municipal Code Chap 10.04	<p>In order to designate and regulate the size and use of structures and lands within Yamhill City, the City is hereby divided into five zones as follows:</p> <ul style="list-style-type: none"> • (A) R-1 Single-family Residential • (B) R-2 Single-family Residential • (C) R-3 Two family Residential • (D) RLC Residential Limited Commercial • (E) C-3 General Commercial Zone <p>The City shall also contain three Overlay zones as follows:</p> <ul style="list-style-type: none"> • (A) PFO Public Facilities Overlay Zone • (B) FHO Flood Hazard Overlay Zone • (C) LUO Limited Use Overlay Zone
	Municipal Code Chap 10.40 FHO Flood Hazard Overlay Zone	<p>To regulate and prohibit some uses in those areas in the Flood Hazard Overlay Zone that would endanger the safety and general welfare of the community.</p> <p>A Flood Hazard Overlay Zone shall be considered as an overlay to any existing zone and the development of said property shall be in accordance with this zone's requirements for USE, except as may be specifically allowed by the Planning Commission under the provisions of this Section.</p> <p>A Flood Hazard Overlay Zone shall be identified on the ZONING MAP in addition to the existing zone. (Ord. 384, §2(part), 1988; Ord. 420, §3, 1997; Ord. 454, §2, 2000)</p>
	Municipal Code Chap 10.92 Land Use and Building Permit Procedure	<p>No building, structure, or premises shall hereafter be used or occupied, and no building or structure or part thereof shall hereafter be erected, constructed, moved, structurally altered, or enlarged unless in conformity with all the regulations herein specified for the zone in which it is located, and then only after applying for and securing all permits and licenses required by all laws and regulations. (Ord. 350, §8.1, 1984; Ord. 420, §3, 1997; Ord. 454, §2, 2000)</p>

Table J-4. Yamhill City Administrative and Technical Resources for Hazard Mitigation	
Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Engineer: Dave Monson Planner: John Morgan
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Engineer: Dave Monson
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Planner: John Morgan
Floodplain manager	Richard Howard or John Morgan
Personnel skilled in GIS and/or HAZUS-MH	Engineer: Dave Monson Planner: John Morgan
Director of Emergency Services	Name: Chief Gordon Rise
Finance (grant writers, purchasing)	Name/position: Department Heads
Public Information Officers	Name: Mayor Randy Murphy

Table J-5. Yamhill City Financial Resources for Hazard Mitigation	
Financial Resources	Effect on Hazard Mitigation
General funds	Yes
Authority to levy taxes for specific purposes	Yes-with voter approval
Incur debt through general obligation bonds	Yes-with voter approval
Incur debt through special tax and revenue bonds	Yes-with voter approval
Incur debt through private activity bonds	Yes-with voter approval
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures.
United State Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

HAZARD IDENTIFICATION AND SCREENING

The following section defines hazard identification as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment: Identifying Hazards	
Identifying Hazards	
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.	
Element	
■ Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	
Source: FEMA, July 2008.	

Yamhill City's Steering Committee determined that the following hazards could potentially threaten the community. Those hazards identified with an (*) are newly identified by the county as part of the update process – those identified with an (X) are specific to Yamhill City.

<i>Natural Hazards</i>	
Flood	X
Winter Storm	X
Landslide	X
Fire (Wildland/Urban)	X
Earthquake	X
Volcano*	
Wind	X
Erosion*	
ENSO (<i>El Niño / La Niña</i>)*	
Expansive Soils*	
Drought	X
<i>Technological Hazards</i>	
Dam Failure*	
Disruption of Utility and Transportation Systems*	
Hazardous Materials*	X
Terrorism*	X
Infectious Disease Epidemic*	

OVERVIEW OF VULNERABILITY ANALYSIS

This section summarizes community specific vulnerability information for Yamhill City to augment the MHMP development process. It comprises:

- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, if possible, the types and numbers of vulnerable future development.
- Estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate.
- Assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The following defines vulnerability analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA, July 2008.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Addressing Repetitive Loss Properties

Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): [The risk assessment]must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, July 2008.

Yamhill City actively participates in FEMA's National Flood Insurance Program (NFIP) and has implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties to assure an effective flood mitigation program.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses

Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Element

- Does the new or updated plan estimate potential dollar losses to vulnerable structures?
- Does the new or updated plan describe the methodology used to prepare the estimate?

Source: FEMA, July 2008.

DMA 2000 Recommendations: Multi-Jurisdictional Risk Assessment

Assessing Vulnerability: Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area

Element

- Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?

Source: FEMA, July 2008.

VULNERABILITY ANALYSIS

Asset Inventory

Asset inventory is the first step of a vulnerability analysis. Assets within each community that may be affected by hazard events include population, residential and nonresidential buildings, critical facilities, and infrastructure.

The asset inventory delineates the City's existing building and infrastructure assets and insured values and are identified in detail in Tables J-6A, J-6B, and J-7.

Tables J-8, J-9, and J-10 portray the City's critical infrastructure numbers and values, and their potential vulnerability by hazard type.

Yamhill City seeks to protect its population by supporting Yamhill County and Oregon State initiatives, ordinances, building codes, and development regulations. One of the most important initiatives is to prohibit or not allow future development of buildings, infrastructure and critical facilities in identified high hazard areas. Any essential infrastructure component will undergo stringent review to ensure potential hazard risk will be mitigated.

Population and Building Stock

Population data listed in Table J-6A were obtained from the 2000 U.S. Census and Portland State University. It comprises census block level data, and estimates from university conducted community research.

The City's existing building and infrastructure and insured values are identified in Tables J-6A, J-6B, and J-7.

Table J-6A. Yamhill City Estimated Population and Building Inventory				
Population			Residential Buildings	
2000 Census	Estimated 2005 Census	Estimated 2007 Census²	Total Building Count	Total Value of Buildings (\$)¹
794	820	820	273	44,908,271 ²

Source: FEMA HAZUS-MH, Version 2006 and U.S. Census 2000.

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$125,200 per structure).

² Portland State University (PSU) 2007 Oregon Population Report.

Table J-6B. Yamhill City NFIP Insurance Report								
City	Total Premiums (\$)	Policies A-Zone	Total Policies	Total Coverage (\$)	Average Premium (\$)	Total Claims Since 1978	Total Paid Since 1978 (\$)	Rep Loss Properties²
Yamhill City	1,888	1	4	996,600	472.00	1	7,280	0

Source: FEMA NFIP Insurance Report June 23, 2008

FEMA SQANet.

²Content and building claims.

(Note – many critical facilities and locations have been identified and included in this inventory and risk assessment – due to their confidential nature, locations have been “shaded” for publication. The data will remain in the report for the County’s future mitigation planning efforts)

Table J-7. Yamhill City Critical Facilities and Infrastructure			
Facility Type	Name / Number	Address	Value¹
Government	City Hall And Police Department with Community Center	205 S. Maple St.	\$942,450
	Public Works Offices and Wastewater Lab	450 S Maple St.	\$272,969
	Public Works Shops	450 S. Maple St.	\$148,455
Emergency Response	Fire Station & Emergency Operations Center	275 S. Olive St.	\$1,690,000
	Fire Trucks		\$860,000
Educational	Elementary School	310 E. Main St.	\$3,367,727
	High School	275 N. Maple St.	\$42,933
	Mid Columbia School Buses		Unknown
	(Other school assets) The School will have this list		\$2,137,409
Community	Beulah Park	W. 3rd and Maple St.	\$401,700
	Menefee Park	8.7 mi. NW on Turner Cr. Rd.	Unknown
	Church of Jesus Christ of the Latter Day Saints	7200 NW Pike Rd.	Unknown
	First Baptist Church	500 W. Main St., Carlton	Unknown
	Yamhill United Methodist Church	195 S. Laurel St.	Unknown
	Yamhill Christian Church	265 W. Main St.	\$422,422
	St. John's Catholic Church	445 N. Maple St.	Unknown
	Pentecostal Church	3928 NW Lincoln Ave.	Unknown
State and Federal Highways	Highway 47	ODOT	1 mile of hwy
	Highway 240		1 mile of hwy
Bridges	Bridge 1 (3 State Bridges on 3 sides of town)		Unknown
	Bridge 2		Unknown
	Bridges 3		Unknown
	1 County bridge on the west side of town		Unknown
Utilities	Wastewater Treatment Plant with four sewage lagoons		\$2,838,260
	Flag Pole/Clock, Chlorine Bldg, Pump House, Headwork's & Generator/ equip.		\$450,289

Table J-7. Yamhill City Critical Facilities and Infrastructure			
Facility Type	Name / Number	Address	Value ¹
	Water Treatment Plant		\$4,460,250
	Lift Station		\$165,830
	Water Tank (2 @ 500K Gallons each)		\$1,256,505
	Verizon Phone Switch Behind City Hall		Unknown
	Yamhill Soil and Water Conservation District		Unknown
Dams	Intake Structure @ water plant		\$750,000
	Impound		\$750,000

Sources:

FEMA HAZUS-MH, local jurisdictions.

¹Estimated and/or insured structural value for critical facilities and estimated values for critical infrastructure.

Vulnerability Analysis

The vulnerability analysis development process is thoroughly discussed in the Yamhill County MHMP, Section 6, which generated the following Hazard Exposure Analysis Overviews. Tables J-8, J-9, and J-10 depict in tabular form results obtained from the GIS analysis depicted in hazard figures located in Appendix K.

Table J-8. Yamhill City Potential Hazard Exposure Analysis Overview-Population and Buildings							
			Population	Buildings			
				Residential		Non-Residential	
Hazard Type	Hazard Area	Methodology	Number	Number	Value (\$)¹	Number	Value (\$)¹
Flood	Moderate	500-year floodplain	--	103	12,895,600	--	--
	High	100-year floodplain	--	34	4,256,800	--	--
Winter Storm		descriptive	820	273	44,908,271	1	Unknown
Landslide	Moderate	14-32 degrees	--	141	17,653,200	1	Unknown
	High	>32 degrees	--	--	--	--	--
Wildland Fire	Moderate	Moderate fuel rank	--	273	44,908,271	1	Unknown
	High	High fuel rank	--	145	18,154,000	1	Unknown
	Very High	Very high fuel rank	--	--	--	--	--
	Extreme	Extreme fuel rank	--	--	--	--	--
Earthquake	Strong	9-20% (g)	820	273	44,908,271	1	Unknown
	Very strong	>20-40% (g)	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--
Wind		descriptive	820	273	44,908,271	1	Unknown
Drought		descriptive	--	--	--	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	--	273	44,908,271	1	Unknown
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	--	--	--	--	--
Terrorism		descriptive	--	--	--	--	--

¹ Average insured structural value of all residential buildings (including single-family dwellings, mobile homes, etc., is \$125,200 per structure) Note-population by parcel was not available at the time this document was prepared. Once this data is available, a useful analysis of population and residential structures by hazard can easily be completed.

Table J-9. Yamhill City Potential Hazard Exposure Analysis Overview-Critical Facilities												
			Government		Emergency Response		Educational		Care		Community	
Hazard Type	Hazard Area	Methodology	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	2	421K	--	--	--	--	--	--	1	401K
	High	100-year floodplain	2	421K	--	--	--	--	--	--	3	824K
Winter Storm		Descriptive	3	1.4M	2	2.6M	4	5.6M	--	--	8	824K
Landslide	Moderate	>14-32 degrees	3	1.4M	1	1.7M	1	3.4M	--	--	8	824K
	High	>32 degrees	--	--	--	--	--	--	--	--	1	unknown
Wildland Fire	Moderate	Moderate fuel rank	3	1.4M	1	1.7M	2	3.4M	--	--	8	824K
	High	High fuel rank	2	421K	--	--	1	3.4M	--	--	4	422K
	Very High	Very high fuel rank	--	--	--	--	--	--	--	--	1	unknown
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	3	1.4M	2	2.6M	4	5.6M	--	--	8	824K
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--
Wind		Descriptive	3	1.4M	2	2.6M	4	5.6M	--	--	8	824K
Drought		Descriptive	--	--	--	--	--	--	--	--	--	--
Hazardous Material Event ⁽²⁾	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	3	1.4M	1	1.7M	2	3.4M	--	--	7	824K
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	3	1.4M	1	1.7M	2	3.4M	--	--	6	824K
Terrorism		Descriptive	3	1.4M	2	2.6M	4	5.6M	--	--	8	824K

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Table J-10. Yamhill City Potential Hazard Exposure Analysis Overview-Critical Infrastructure														
			Highways		Railroads		Bridges		Transportation Facilities		Utilities		Dams	
Hazard Type	Hazard Area	Methodology	Miles	Value (\$)¹	Miles	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹	No.	Value (\$)¹
Flood	Moderate	500-year floodplain	--	--	--	--	2	unknown	--	--	4	3.7M	--	--
	High	100-year floodplain	--	--	--	--	3	unknown	--	--	4	3.7M	--	--
Winter Storm		descriptive	2	unknown	--	--	4	unknown	--	--	8	9.4M	2	1.5M
Landslide	Moderate	>14-32 degrees	--	--	--	--	3	unknown	--	--	7	9.4M	2	1.5M
	High	>32 degrees	--	--	--	--	1	unknown	--	--	1	1.3M		
Wildland Fire	Moderate	Moderate fuel rank	--	--	--	--	4	unknown	--	--	8	9.4M	2	1.5M
	High	High fuel rank	--	--	--	--	4	unknown	--	--	8	9.4M	2	1.5M
	Very High	Very high fuel rank	--	--	--	--	1	unknown	--	--	2	5.7M	2	1.5M
	Extreme	Extreme fuel rank	--	--	--	--	--	--	--	--	--	--	--	--
Earthquake	Strong	9-20% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Very strong	>20-40% (g)	--	--	--	--	--	--	--	--	--	--	--	--
	Severe	>40-60% (g)	--	--	--	--	--	--	--	--	--	--	--	--
Wind		descriptive	2	unknown	--	--	4	unknown	--	--	8	9.4M	2	1.5M
Drought		descriptive	2	unknown	--	--	4	unknown	--	--	8	9.4M	2	1.5M
Hazardous Material Event ²)	1/4-mile buffered transportation routes	1/4-mile buffered transportation routes	2 unknown	unknown	--	--	3	unknown	--	--	5	3.7M	--	--
	1/4-mile buffered EHS sites	1/4-mile buffered EHS sites	2 unknown	unknown	--	--	2	unknown	--	--	6	3.7M	--	--
Terrorism		descriptive	2	unknown	--	--	4	unknown	--	--	8	9.4M	2	1.5M

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SUMMARY OF VULNERABILITIES AND IMPACTS TO HAZARD AREAS

The following section describes each hazard and the community's vulnerabilities and impacts from natural hazards in addition to technological and manmade hazards identified in the 2009 Yamhill County MHMP.

The following is derived from the best available data for facility locations and values. In many cases, values were unavailable, and therefore the totals listed below should be considered incomplete and likely less than the actual costs associated with the respective hazards.

Flood

FEMA FIRMs were used to outline the 100-year and 500-year floodplains for Yamhill City. The 100-year floodplain delineates an area of high risk, while the 500-year floodplain delineates an area of moderate risk.

In Yamhill City, 34 residential structures (value \$4.3M), two government facilities (value \$421K), three community facilities (value \$824K), three bridges (value unknown), and four utilities (value \$3.7M) are located within the boundaries of the 100-year floodplain and therefore accorded a high risk.

The 500-year floodplain contains 103 residential structures (value \$12.9M), two government facilities (value \$421K), one community facility (value \$401K), two bridges (value unknown), and four utilities (value \$3.7M) and are accorded a moderate risk.

Winter Storm

Winter storms have widespread impacts that are most often the result of the ice, cold, high winds and flooding they bring. Damage to facilities and infrastructure can be severe, depending on the intensity of the storm event.

Since winter storms are regional events, all of Yamhill City can be equally affected. Therefore 820 residents, 273 residential structures (value \$44.9M), one non-residential structure (value unknown), three government facilities (value \$1.4M), two emergency response facilities (value \$2.6M), four educational facilities (value \$5.6M), eight community facilities (value \$824K), two highway segments (value unknown), four bridges (value unknown), eight utilities (value \$9.4M), and two dams (value \$1.5M) are at risk.

Landslide

The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and waste water utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.

USGS elevation datasets were used to determine the landslide hazard areas within Yamhill City. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.

Using these guidelines, Yamhill City has 141 residential structures (value \$17.7M), one non-residential structure (value unknown), three government facilities (value \$1.4M), one emergency response facility (value \$1.7M), one educational facility (value \$3.4M), eight community facilities (value \$824K), three bridges (value unknown), seven utilities (value \$9.4M), and two dams (value \$1.5M) located in areas of moderate risk.

One community facility (value unknown), one bridge (value unknown), and one utility (value \$1.3M) are located in an area of high risk.

Wildland Fires

Wildland fire hazard areas were identified using a model incorporating slope, aspect, and fuel load. South-facing, steep, and heavily vegetated areas were assigned the highest fuel values while areas with little slope and natural vegetation were assigned the lowest fuel values. Fuel ranks of moderate, high, very high, and extreme were assigned to the entire region based on the results of this modeling.

Yamhill City has critical facilities and infrastructure located within areas with moderate, high, and very high fuel ranks. Moderate fuel rank areas contain 273 residential structures (value \$44.9M), one non-residential structure (value unknown), three government facilities (value \$1.4M), one emergency response facility (value \$1.7M), two educational facilities (value \$3.4M), eight community facilities (value \$824K), four bridges (value unknown), eight utilities (value \$9.4M), and two dams (value \$1.5M).

High fuel rank areas contain 145 residential structures (value \$18.2M), one non-residential structure (value unknown), two government facilities (value \$421K), one educational facility (value \$3.4M), four community facilities (value \$422K), four bridges (value unknown), eight utilities (value \$9.4M), and two dams (value \$1.5M).

Very high fuel rank areas contain one community facility (value unknown), one bridge (value unknown), two utilities (value \$5.7M) and two dams (value \$1.5M).

Earthquake

Based on PGA shake maps produced by the USGS, the western portion of Yamhill County is likely to experience higher levels of shaking than the eastern portion, as a result of its proximity to the Cascadia Subduction Zone. Ground movement in both areas, however, is likely to cause damage to weak, unreinforced masonry buildings, and to induce small landslides along unstable slopes. As well as landslide, earthquakes can trigger other hazards such as dam failure and disruption of transportation and utility systems.

Yamhill City is in the eastern portion of Yamhill County, in a region likely to experience strong shaking should a subduction zone earthquake occur. In contrast, the western portion of the county is likely to experience very strong shaking. This rating represents the peak acceleration

of the ground caused by the earthquake, and for a strong designation corresponds to 9-20 percent of the acceleration of gravity.

The entire Yamhill City can be equally affected by earthquakes. Therefore 820 residents, 273 residential structures (value \$44.9M), one non-residential structure (value unknown), three government facilities (value \$1.4M), two emergency response facilities (value \$2.6M), four educational facilities (value \$5.6M), eight community facilities (value \$824K), two highway segments (value unknown), four bridges (value unknown), eight utilities (value \$9.4M), and two dams (value \$1.5M) are at risk.

Wind

Many buildings, utilities and transportation systems in open areas, natural grasslands, or agricultural lands are especially vulnerable to wind damage. Impacts associated with wind can include damage to power lines, trees, and structures, and can also cause temporary disruptions of power. Additionally, high winds can cause significant damage to forestlands.

All areas within Yamhill City are equally at risk of a windstorm event. Therefore 820 residents, 273 residential structures (value \$44.9M), one non-residential structure (value unknown), three government facilities (value \$1.4M), two emergency response facilities (value \$2.6M), four educational facilities (value \$5.6M), eight community facilities (value \$824K), two highway segments (value unknown), four bridges (value unknown), eight utilities (value \$9.4M), and two dams (value \$1.5M) are at risk.

Drought

State-wide droughts have historically occurred in Oregon, and as it is a region-wide phenomenon, all residents are equally at risk. Structural damage from drought is not expected; rather the risks apply to humans and resources. Industries important to Yamhill City's local economy such as agriculture, fishing, and timber have historically been affected, and any future droughts would have tangible economic and potentially human impacts.

Hazardous Material Event

The National Response Center and the EPA's Environmental Facts Multisystem Query were used to locate hazardous waste handling facilities and businesses that generate hazardous waste from their activities. Transportation routes likely to carry hazardous waste were examined, and all facilities within a 0.25 miles of a transportation route and an EHS facility are considered at risk.

In Yamhill City, 273 residential structures (value \$34.2M), one non-residential structures (value unknown), three government facilities (value \$1.4M), one emergency response facility (value \$1.7M), two educational facilities (value \$3.4M), seven community facilities (value \$824K), two highways (values unknown), three bridges (values unknown), and five utilities (value \$3.7M) are located within the 0.25 mile risk area.

Three government facilities (value \$1.4M), one emergency response facility (value \$1.7M), two educational facilities (value \$3.4M), six community facilities (value \$824K), two highways (values unknown), two bridges (values unknown), and six utilities (value \$3.7M) are within the 0.25 mile-buffered EHS sites.

Terrorism

It is difficult to determine the scope of any terrorist threat to Yamhill City. Although there seem to be few high-profile targets present, it is impossible to predict future terrorist events. Depending on the extent of the action, the community may suffer economic loss, disruption of utilities, and cleanup relating to explosions and other facility damages. All facilities and residents are at equal risk of being impacted by this threat.mitigation strategy

IDENTIFYING MITIGATION ACTIONS

The following section defines mitigation action identification and analysis as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Identification and Analysis of Mitigation Actions

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the new or updated plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

Source: FEMA, July 2008.

The Steering Committee assessed whether to adopt Yamhill County’s mitigation goals listed in Table J-11, or to revise them to more fully meet the City’s needs. The City then proceeded to evaluate potential mitigation actions after finalizing the mitigation goals.

Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Table J-12 depicts the City’s “considered” mitigation actions developed during this mitigation planning process. The revised list in Table J-14 delineates those actions the City will strive to implement within this five year planning cycle.

DMA 2000 Requirements: Mitigation Strategy - National Flood Insurance Program (NFIP) Compliance

National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction’s participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element

- Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
- Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?

Source: FEMA, July 2008.

Yamhill City actively participates in FEMA's National Flood Insurance Program (NFIP) and have implemented floodplain policies, regulations, and ordinances to protect their threatened population and infrastructure to assure NFIP compliance.

The City's Mitigation Strategy identified and analyzed potential flood mitigation actions that would fulfill NFIP initiatives, specifically addressing repetitive loss (RL) properties. They subsequently selected and prioritized City appropriate actions to assure an effective flood mitigation program.

MITIGATION GOALS AND ACTION ITEMS CONSIDERED

Table J-11. 2006 Yamhill County Mitigation Goals-Considered	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

Table J-12. Yamhill City Mitigation Actions Considered

Hazard	Status	Comment	Description
Natural Hazards			
Multi-Hazard (MH)			
MH	<i>Ongoing</i>		Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)
MH	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure fuel oil and propane tanks are properly anchored and hazardous materials are properly stored and protected from known natural hazards such as seismic or flooding events.
MH	Consider		Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, land use, transportation plans, etc to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
MH	Consider		Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas.
MH	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load and wind storm power line failure during severe wind or winter ice storm events.
MH	<i>Ongoing</i>		Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)
MH	<i>Ongoing</i>		Install lightening rods and lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.
MH	Consider		Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards.
MH	Consider		Explore the need for, develop, and implement hazard zoning ordinances for high-risk hazard area land-use.
MH	Consider		Based on known high-risk hazard areas, identify hazard-specific signage needs and purchase and install hazard warning signs near these areas to notify and educate the public of potential hazards.
MH	Consider		Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to acquire, relocate, elevate, and/or flood proof to protect the threatened population.
MH	<i>Ongoing</i>		Install storm shutters, hurricane clips, bracing systems etc. to meet or exceed applicable building codes while reducing disaster damages.
MH	Consider		Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.

Table J-12. Yamhill City Mitigation Actions Considered

Hazard	Status	Comment	Description
MH	Consider		Develop vegetation projects to restore clear cut and riverine erosion damage and to increase landslide susceptible slope stability.
MH	Consider		Retrofit structures to protect them from seismic, floods, high winds, earthquakes, or other natural hazards.
MH	Consider		Acquire, demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas.
MH	Consider		Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages.
MH	Consider		Establish a formal role for the jurisdictional Hazard Mitigation Planning Committees to develop a sustainable process to implement, monitor, and evaluate citywide mitigation actions.
MH	Consider		Identify and pursue funding opportunities to implement mitigation actions.
MH	Consider		Develop public and private sector partnerships to foster hazard mitigation activities.
MH	Consider		Integrate the Mitigation Plan findings into planning and regulatory documents and programs and into enhanced emergency planning.
Flood			
Flood	Consider		Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains.
Flood	Consider		Develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains.
Flood	Consider		Develop and maintain GIS mapped inventory of repetitive loss properties to include the types and numbers of properties.
Flood	Consider		Develop and implement mitigation actions for repetitive loss properties.
Flood	Consider		Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100- year floodplain using survey elevation data.
Flood	Consider		Implement mitigation measures identified by critical facilities' owners, and other facility owners, to protect facilities located within the 100-year floodplain.
Flood	Consider		Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current USACOE flood data.
Flood	Consider		Request DOGAMI debris flow and lahar data be included in FIRM updates. Use the updated FIRMS for land use and mitigation planning.
Flood	Consider		Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures.
Flood	Consider		Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability to facilitate continued compliance with the NFIP.
Flood	Consider		Develop, implement, and enforce floodplain management ordinances.
Flood	Consider		Develop outreach program to educate residents concerning flood proofed well and sewer/septic installation.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof identified properties.
Flood	Consider		Acquire, relocate, elevate, or otherwise flood-proof critical facilities.

Table J-12. Yamhill City Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	Consider		Install new streamflow and rainfall measuring gauges.
Flood	Consider		Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.
Flood	Consider		Dry flood proof non-residential structures.
Flood	Consider		Dry flood proof historic structures.
Flood	Consider		Construct earthen berms to divert flood flows into bridge or culvert openings. The earth fill should be erosion-resistant and the berms should be covered with erosion-resistant fabric, armoring materials, or vegetation.
Flood	Ongoing		Increase culvert size to increase its drainage efficiency.
Flood	Ongoing		Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.
Flood	Ongoing		Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.
Flood	Consider		Construct debris deflectors to deflect the major portion of debris away from culvert entrances and bridge piers. They are normally "V" shaped.
Flood	Consider		Install debris fins upstream of a culvert to align debris so that the debris will pass through a drainage opening without clogging the inlet. They are sometimes used on bridge piers to deflect drifting materials.
Flood	Consider		Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings. Water ultimately returning to its watercourse at a reduced flow rate.
Flood	Consider		Construct an emergency spillway at a dam or other structure to relieve excess water contained during high flow periods to reduce dam failure potential.
Flood	Consider		Construct floodwalls around the perimeter of a "facility" and extending above the highest flood elevation to keep floodwaters away from the facility. Floodwalls can be made from gabion baskets, concrete, large riprap, etc. Floodwalls should be used with caution as they can also act as a catchment preventing drainage away from the facility.
Flood	Consider		Install triangular or circular flow deflectors on or immediately upstream from bridge footings to deflect water flow and reduce flow velocities preventing footing scour.
Flood	Consider		Construct low water crossings in a road prism to carry flood flows from an intermittent drainage
Flood	Consider		Construct a high water overflow crossing to carry flood flows from over bank areas.
Flood	Consider		Realign bridge piers & abutments to be parallel with the stream's centerline. This prevents pier and abutment undermining and reduces debris catchment.
Flood	Consider		Create relief drainage ditch opening using a culvert, bridge, or multiple culverts; to relieve rapid water accumulation during high water flow events. .
Flood	Consider		Raise bridge height or convert bridge from a multi-span to single span to increase water flow and reduce debris catchment.
Flood	Consider		Modify existing culverts by developing a ring compression, by flattening, or beveling the end of a circular culvert to match the angle of the embankment. May need to install flanges to stiffen the beveled section of the culvert.

Table J-12. Yamhill City Mitigation Actions Considered

Hazard	Status	Comment	Description
Flood	Consider		Construct spur dikes along the embankments to direct flood flows into a bridge opening or away from a continuous impact site.
Flood	Consider		Construct concrete wing walls at culvert or bridge entrances and outlets to direct water flow into their openings
Flood	Consider		Provide flood protection to mitigate damage and contamination of wastewater treatment systems.
Flood	Consider		Develop and implement flood risk reduction program and outreach efforts considering upstream storage, channel improvements, and flood walls or levee construction.
Winter Storm			
Winter Storm	Consider		Develop and implement strategies and educational outreach programs for debris management from severe winter storms.
Winter Storm	Consider		Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.
Winter Storm	Consider		Update or develop, implement, and maintain jurisdictional debris management plans.
Winter Storm	Consider		Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.
Winter Storm	Consider		Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.
Winter Storm	Consider		Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events.
Winter Storm	Ongoing		Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.
Winter Storm	Consider		Develop personal use and educational outreach training for a “safe tree harvesting” program. Implement along utility and road corridors, preventing potential winter storm damage.
Winter Storm	Consider		Purchase NOAA Weather radios and develop a web portal linking residents to various weather information sites. (NWS, FEMA, The Weather Channel).
Winter Storm	Consider		Install new streamflow and precipitation measuring gauges and develop monitoring and early warning program.
Winter Storm	Consider		Develop outreach program with school district contests having students develop, display, and explain mitigation projects or initiatives.
Winter Storm	Consider		Develop early warning test program partnering with NOAA, City Police, Fire Departments, and Volunteer Fire Department to coordinate tests.
Winter Storm	Ongoing		Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.
Winter	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line

Table J-12. Yamhill City Mitigation Actions Considered

Hazard	Status	Comment	Description
Storm			severe wind or winter ice storm event failure.
Winter Storm	Consider		Review critical facilities and government building energy efficiency, winter readiness, and electrical protection capability. Identify, prioritize, and implement infrastructure upgrade or rehabilitation project prioritization and development.
Landslide			
Landslide	Consider		Complete a landslide location inventory, identify threatened critical facilities and other buildings and infrastructure.
Landslide	Consider		Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.
Landslide	Consider		Develop process to limit future development in high landslide potential areas (permitting, geotechnical review, soil stabilization techniques, etc).
Landslide	Ongoing		Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.
Landslide	Consider		Develop comprehensive geological landslide and rockslide prone area maps.
Landslide	Consider		Develop a vegetation management plan addressing slope-stabilizing root strength while facilitating precipitation containment.
Landslide	Consider		Identify and seasonally restrict recreational and construction activities in high landslide areas.
Landslide	Consider		Develop, implement and enforce property development landslide risk assessment procedures to identify potential facility vulnerability.
Wildland Fire			
Wildland Fire	Consider		Identify critical facilities and vulnerable populations based on mapped high hazard areas.
Wildland Fire	Consider		Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.
Wildland Fire	Consider		Develop Community Wildland Fire Protection Plans for all at-risk communities.
Wildland Fire	Consider		Provide real-time internet access and interagency cooperation to decrease wildland fire warning times.
Wildland Fire	Consider		Hold FireWise workshop to educate residents and contractors concerning fire resistant landscaping.
Wildland Fire	Consider		Promote FireWise building siting, design, and construction materials.
Wildland Fire	Consider		Retrofit structures with FireWise building design materials.
Wildland Fire	Consider		Develop FireWise Public Service Announcements (PSA).

Table J-12. Yamhill City Mitigation Actions Considered

Hazard	Status	Comment	Description
Wildland Fire	Consider		Provide wildland fire information in an easily distributed format for all residents.
Wildland Fire	Consider		Schedule and perform government facility "fire drills" at least twice per year.
Wildland Fire	Consider		Conduct residential audits for wildland and building fire hazard identification then develop an outreach program to convey the findings.
Wildland Fire	Consider		Develop, adopt, and enforce burn ordinances that require burn permits, restricts campfires, and controls outdoor burning.
Wildland Fire	Consider		Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high risk areas.
Wildland Fire	Consider		Develop outreach program to educate and encourage home landscape cleanup (defensible space) and define debris disposal programs.
Wildland Fire	Consider		Identify, develop, and implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas.
Earthquake			
Earthquake	Consider		Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.
Earthquake	Consider		Identify high seismic hazard areas; develop a wood-frame residential building inventory and an outreach program to educate population concerning facilities particularly vulnerable to earthquake damage, such as pre-1940s homes and homes with cripple wall foundations.
Earthquake	Consider		Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits.
Earthquake	Consider		Retrofit important public facilities with significant seismic vulnerabilities, such as unreinforced masonry construction.
Earthquake	Consider		Retrofit bridges that are not seismically adequate for lifeline transportation routes.
Earthquake	Ongoing		Update existing (or adopt the most current) Uniform Building Code
Earthquake	Ongoing		Implement and enforce the Uniform, International, and State Building Codes.
Earthquake	Ongoing		Inspect and/or certify all new construction.
Earthquake	Consider		Develop public outreach program to train earthquake safety; perform drop-cover-hold drills at schools and public facilities.
Earthquake	Consider		Develop outreach program to educate population concerning household, business, and public facility mitigation measures. For example, staff public information tables at fairs, safety events, and festivals.
Earthquake	Consider		Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses.

Table J-12. Yamhill City Mitigation Actions Considered

Hazard	Status	Comment	Description
Earthquake	Consider		Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current Building Codes.
Earthquake	Consider		Identify and prioritize a list of critical facilities with unreinforced masonry problems including non-structural projects such as brick chimney bracing or replacement, water heater bracing, and anchoring, etc.
Earthquake	Consider		Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.
Earthquake	Consider		Develop outreach program for educating private facilities concerning alternative or emergency power source acquisition to enable them to deliver food, fuel, and medical services during disaster emergency response and recovery efforts.
Earthquake	Consider		Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability.
Earthquake	Consider		Develop partnerships to mitigate hazards that result in jurisdictional facility lifeline or emergency transportation route closures.
Wind			
Wind	<i>Ongoing</i>		Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)
Wind	Consider		Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.
Wind	<i>Ongoing</i>		Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.
Wind	Consider		Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load power line failure during severe wind or winter ice storm events.
Wind	Consider		Develop prioritized location list to construct safe rooms to provide tornado and severe wind shelters for public and private use. Projects must meet requirements in FEMA 320 and FEMA 361.
Drought			
Drought	Consider		Develop inventory of low moisture tolerant crops to reduce drought impact to agricultural lands. Promote outreach programs that address soil health and soil moisture preservation.
Drought	Consider		Develop outreach agricultural programs that promote reducing topsoil loss during drought conditions and to encourage soil moisture level monitoring to help minimize crop loss.
Drought	Consider		Develop educational programs and initiatives related to water conservation and irrigation during drought periods.
Technological and Manmade Hazards			
Hazardous Materials (HAZMAT)			
HAZMAT	Consider		Annually review and update HAZMAT inventories and ensure that emergency responders are trained for site-specific incidents.
HAZMAT	Consider		Enhance emergency planning, emergency response training, and equipment acquisition to address hazardous materials incidents for emergency and first responders and public works staff.
HAZMAT	Consider		Evaluate existing security measures for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS) and enhance security as necessary.

Table J-12. Yamhill City Mitigation Actions Considered

Hazard	Status	Comment	Description
HAZMAT	Consider		Evaluate seismic bracing/anchoring for sites with large quantities of hazardous substances (HS) or any quantities of extremely hazardous substances (EHS).
HAZMAT	Consider		Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.
HAZMAT	Consider		Develop outreach program to educate the public regarding chemical hazards, safe handling, storage, and disposal procedures.
HAZMAT	Consider		Research, develop, and implement methods to protect waterways from hazardous materials events.
HAZMAT	Consider		Prepare a site-specific summary of hazardous materials used, stored, and commonly transported in the jurisdictional area. The summary should include mapped facility locations with a hazardous materials inventory, emergency response protocols, and mitigation actions.
Terrorism			
Terrorism	Consider		Enhance emergency planning, organization, equipment, exercise, and emergency response training to address all potential terrorism incidents.
Terrorism	Consider		Upgrade physical security, detection, and response capability for critical facilities using information obtained from hazard assessments and risk analysis. Include water systems and any high-profile facilities such as major timber industry facilities and sites with large quantities of hazardous substances (HS) and extremely hazardous substances (EHS).

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The following section defines mitigation action evaluation and implementation as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in **section (c)(3)(ii)** will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources, and the timeframe to complete the action?
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?
- Does the updated plan identify the completed, deleted, or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?

Source: FEMA, July 2008.

The Steering Committee met on September 23, 2008 to evaluate and prioritize each of the mitigation actions to determine which considered actions would be included in the Mitigation Action Plan. The Committee then met on October 16, 2008 to determine the responsible agency and potential funding sources. The Committee met again on November 5, 2008 to finalize the Mitigation Action Plan. It represents mitigation projects and programs to be implemented through the cooperation of multiple entities.

The Yamhill City Steering Committee evaluated the Benefit-Cost Analysis Fact Sheet (Appendix P) for prioritizing its “considered” mitigation actions listed in Table J-12. The Steering Committee determined that the committee consisted of sufficient expertise to select those mitigation actions that would most benefit the City without using the STAPLE-E evaluation tool. Upon review, the Steering Committee assigned a high priority ranking to actions that best fulfill the goals of the MHMP and are appropriate and feasible for the City and responsible entities to implement during the 5-year lifespan of this version of the MHMP. As such, the Steering Committee determined that only the existing and new mitigation actions that received a high priority ranking would be included in the countywide Mitigation Action Plan. Table J-14 depicts the City’s mitigation actions grouped by hazard and in descending priority order within each hazard.

MITIGATION GOALS AND ACTIONS PRIORITIZED & ASSIGNED

Yamhill City reviewed the Yamhill County goals and determined they meet the City's needs and subsequently implemented the Goals in Table J-13 for the current planning period.

Table J-13. Yamhill City Mitigation Goals	
Goal Number	Goal Description
1	EMERGENCY OPERATIONS <i>Goal Statement:</i> Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.
2	EDUCATION AND OUTREACH <i>Goal Statement:</i> Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
3	PARTNERSHIPS <i>Goal Statement:</i> Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.
4	PREVENTIVE <i>Goal Statements:</i> - Develop and implement activities to protect human life, commerce, and property from natural hazards. - Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.
5	NATURAL RESOURCES UTILIZATION <i>Goal Statement:</i> Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.
6	IMPLEMENTATION <i>Goal Statement:</i> Implement strategies to mitigate the effects of natural hazards.

IMPLEMENTING A MITIGATION ACTION PLAN

The following section defines the mitigation action identification process for each participating jurisdiction as stipulated in DMA 2000 and its implementing regulations.

DMA 2000 Requirements: Mitigation Strategy-Identification of Multi-Jurisdictional Mitigation Actions	
Identification of Multi-Jurisdictional Mitigation Actions	
Requirement §201.6(c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	
Element	
<ul style="list-style-type: none"> Does the new or updated plan include identifiable action items for each jurisdiction requesting FEMA approval of the plan? Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred? 	
Source: FEMA, July 2008.	

Table J-14 displays Yamhill City’s Mitigation Action Plan matrix that lists mitigation actions by hazard and are only prioritized within each hazard, not in total. Each mitigation action will be implemented and administered by the applicable managing department, agency, or responsible entity.

***Whenever TBD is used, it means that a benefit/cost analysis will be completed as a project is developed to validate the most appropriate mitigation action.*

Table J-14. Yamhill City Mitigation Action Plan Matrix						
Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Natural Hazards						
Multi-Hazard (MH)						
MH	Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project.	Yamhill County	1-3 years	County Funds	BC: TBD TF: Yes	
MH	Complete critical facility data collection to allow a more thorough vulnerability analysis for the City’s infrastructure.	Administration	1-5 years	General Fund	BC: TBD TF: Yes	
MH	Develop and incorporate building ordinances commensurate with building codes to reflect survivability from wind, seismic, fire, and other hazards to ensure occupant safety.	City Admin, Public Works	Ongoing	City General Fund	BC: TBD TF: Yes	
MH	Review ordinances and develop outreach programs to assure mobile homes and manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, and other methods as applicable)	City Admin, Public Works	Ongoing	City General Fund	BC: TBD TF: Yes	
MH	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage pump stations, etc.)	City Admin, Public Works	Ongoing	City General Fund, HMGP, HMA, HSGP	BC: TBD TF: Yes	
MH	Install lightening rods and lightening grade surge protection devices on critical electronic components such as warning systems, communications equipment, and computers for critical facilities.	City Admin, Public Works	Ongoing	General Fund, HMGP	BC: TBD TF: Yes	
MH	Install storm shutters, hurricane clips, bracing systems etc. to meet or exceed applicable building codes while reducing disaster damages.	City Admin, Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD TF: Yes	

Table J-14. Yamhill City Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
<i>Flood</i>						
Flood	Develop, or revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention basins.	Yamhill County & City Admin	1-4 years	General Fund	BC: TBD TF: Yes	
Flood	Modify existing culverts by developing a ring compression, by flattening, or beveling the end of a circular culvert to match the angle of the embankment. May need to install flanges to stiffen the beveled section of the culvert.	Yamhill County & City Admin, Public Works	1-4 years	General Fund, HMGP, HMA	BC: TBD TF: Yes	
Flood	Increase culvert size to increase its drainage efficiency.	City Admin, Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD TF: Yes	
Flood	Construct debris basins to retain debris in order to prevent downstream drainage structure clogging.	City Admin, Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD TF: Yes	
Flood	Install debris cribs over culvert inlets to prevent inflow of coarse bed-load and light floating debris.	City Admin, Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD TF: Yes	
<i>Winter Storms</i>						
Winter Storm	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.	City Admin	3-8 years	General Fund	BC: TBD TF: Yes	
Winter Storm	Develop critical facility list needing emergency back-up power systems, prioritize, seek funding and implement mitigation actions.	City Admin	1-2 years	City General Fund, HMGP, HMA, HSGP	BC: TBD TF: Yes	
Winter Storm	Develop and maintain severe winter storm public outreach program defining mitigation activity benefits through educational outreach aimed at households and businesses while targeting of special needs populations.	Yamhill County & City Admin	2-3 years	City General Fund, HMGP, HMA, HSGP	BC: TBD TF: Yes	
Winter Storm	Develop, implement, and maintain partnership program with electrical utilities to use underground utility placement methods where possible to reduce or eliminate power outages from severe winter storms. Consider developing incentive programs.	City Admin, Utility Co	Ongoing	General Fund	BC: TBD TF: Yes	

Table J-14. Yamhill City Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Winter Storm	Implement and enforce the most current Uniform International, and State, Building Codes to ensure structures can withstand winter storm hazards such as high winds, rain, water and snow.	City Admin, Public Works	Ongoing	General Fund	BC: TBD TF: Yes	
Landslide						
Landslide	Complete a landslide location inventory, identify threatened critical facilities and other buildings and infrastructure.	Yamhill County	Ongoing	County Funds	BC: TBD TF: Yes	
Landslide	Develop prioritized list of mitigation actions for threatened critical facilities and other buildings or infrastructure.	City Admin	1-4 years	General Fund, HMGP, HMA	BC: TBD TF: Yes	
Landslide	Update the storm water management plan to include regulations to control runoff, both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.	Public Works	Ongoing	General Fund, HMGP, HMA, HSGP	BC: TBD TF: Yes	
Wildland Fires						
Wildland Fire	Identify critical facilities and vulnerable populations based on mapped high hazard areas.	Yamhill County & City of Yamhill	1-3 years	General Fund, FMAP	BC: TBD TF: Yes	
Wildland Fire	Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures.	Yamhill County	1-3 years	General Fund, FMAP	BC: TBD TF: Yes	
Wildland Fire	Promote FireWise building siting, design, and construction materials.	Yamhill County & City of Yamhill	1-3 years	General Fund, FMAP	BC: TBD TF: Yes	
Earthquake						
Earthquake	Supplement State Seismic Needs Analysis data (schools, fire, law enforcement). Complete inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.	Yamhill County	1-5 years	County Funds	BC: TBD TF: Yes	
Earthquake	Retrofit bridges that are not seismically adequate for lifeline transportation routes.	ODOT & Yamhill County	1-5 years	FHWA, County DOT Funds	BC: TBD TF: Yes	

Table J-14. Yamhill City Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
Earthquake	Update existing (or adopt the most current) Uniform Building Code	City Admin	Ongoing	General Fund	BC: TBD TF: Yes	
Earthquake	Implement and enforce the Uniform, International, and State Building Codes.	City Admin	Ongoing	General Fund	BC: TBD TF: Yes	
Earthquake	Inspect and/or certify all new construction.	Public Works, Building Dept	Ongoing	General Fund	BC: TBD TF: Yes	
Wind						
Wind	Identify and prioritize critical facilities' overhead utilities that could be placed underground to reduce power disruption from wind storm / tree blow down damage.	ODOT, Yamhill County & City of Yamhill, Utility Co	1-5 years	General Fund, County, & Utility Funds	BC: TBD TF: Yes	
Wind	Review ordinances and develop outreach programs to assure manufactured buildings are protected from severe wind and flood hazards. (Anchoring, elevation, siting, and other methods as applicable)	City Admin, Public Works	Ongoing	General Fund, HMGP, HMA	BC: TBD TF: Yes	
Wind	Revise requirements to place utilities underground to reduce power disruption from wind storm / tree blow down damage when upgrading or during new development.	City Admin, Public Works	Ongoing	General Fund	BC: TBD TF: Yes	
Drought						
Drought	Develop educational programs and initiatives related to water conservation and irrigation during drought periods.	Yamhill County & City of Yamhill	1-4 years	General Fund, HMGP, EPA,	BC: TBD TF: Yes	
Manmade and Technological Hazards						
Hazardous Materials (HAZMAT)						
HAZMAT	Train Public Works staff to identify extremely hazardous substances (EHS) and to follow EMS protocols.	Yamhill County & City of Yamhill	1-3 years	General Fund, EPA, CERCLA, SARA, HSGP,	BC: TBD TF: Yes	

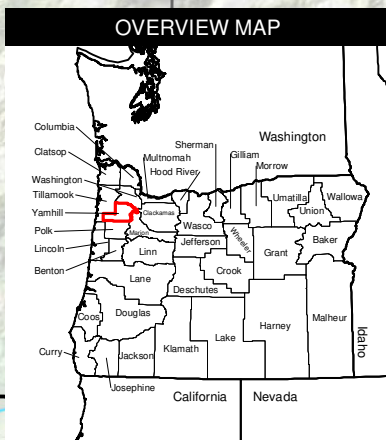
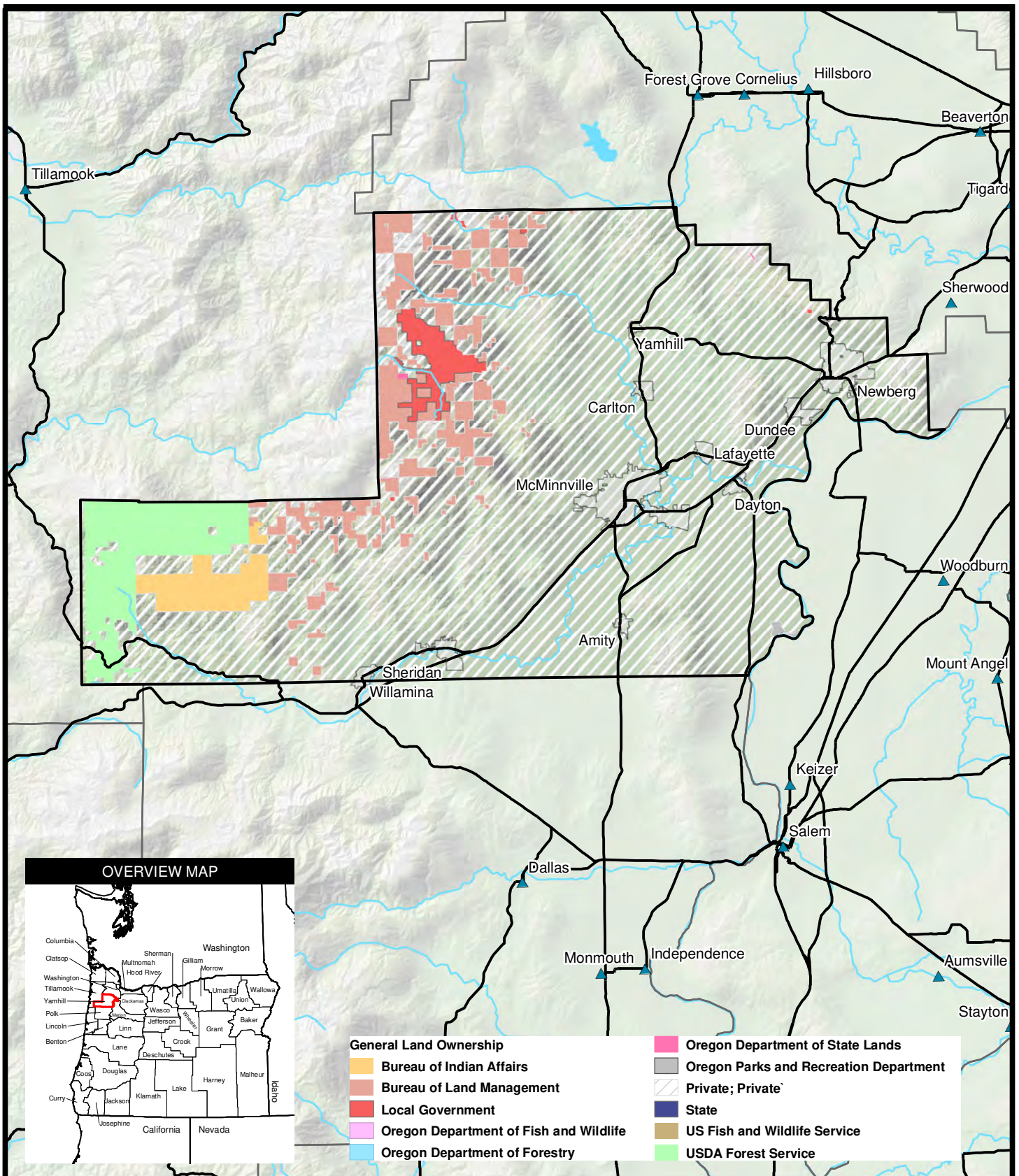
Table J-14. Yamhill City Mitigation Action Plan Matrix

Hazard	Description	Managing Department / Agency	Timeframe	Potential Funding Source(s)	Benefit-Costs / Technical Feasibility	Comments
<i>Terrorism</i>						
Terrorism	Upgrade physical security, detection, and response capability for critical facilities using information obtained from hazard assessments and risk analysis. Include water systems and any high-profile facilities such as major timber industry facilities and sites with large quantities of hazardous substances (HS) and extremely hazardous substances (EHS).	Yamhill County , City Admin, Police, & Fire	1-4 years	General Fund, HSGP,	BC: TBD TF: Yes	

Appendix K

Figures

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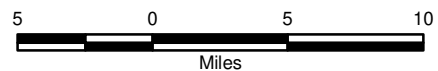


General Land Ownership	
 Bureau of Indian Affairs	 Oregon Department of State Lands
 Bureau of Land Management	 Oregon Parks and Recreation Department
 Local Government	 Private; Private
 Oregon Department of Fish and Wildlife	 State
 Oregon Department of Forestry	 US Fish and Wildlife Service
	 USDA Forest Service

LEGEND

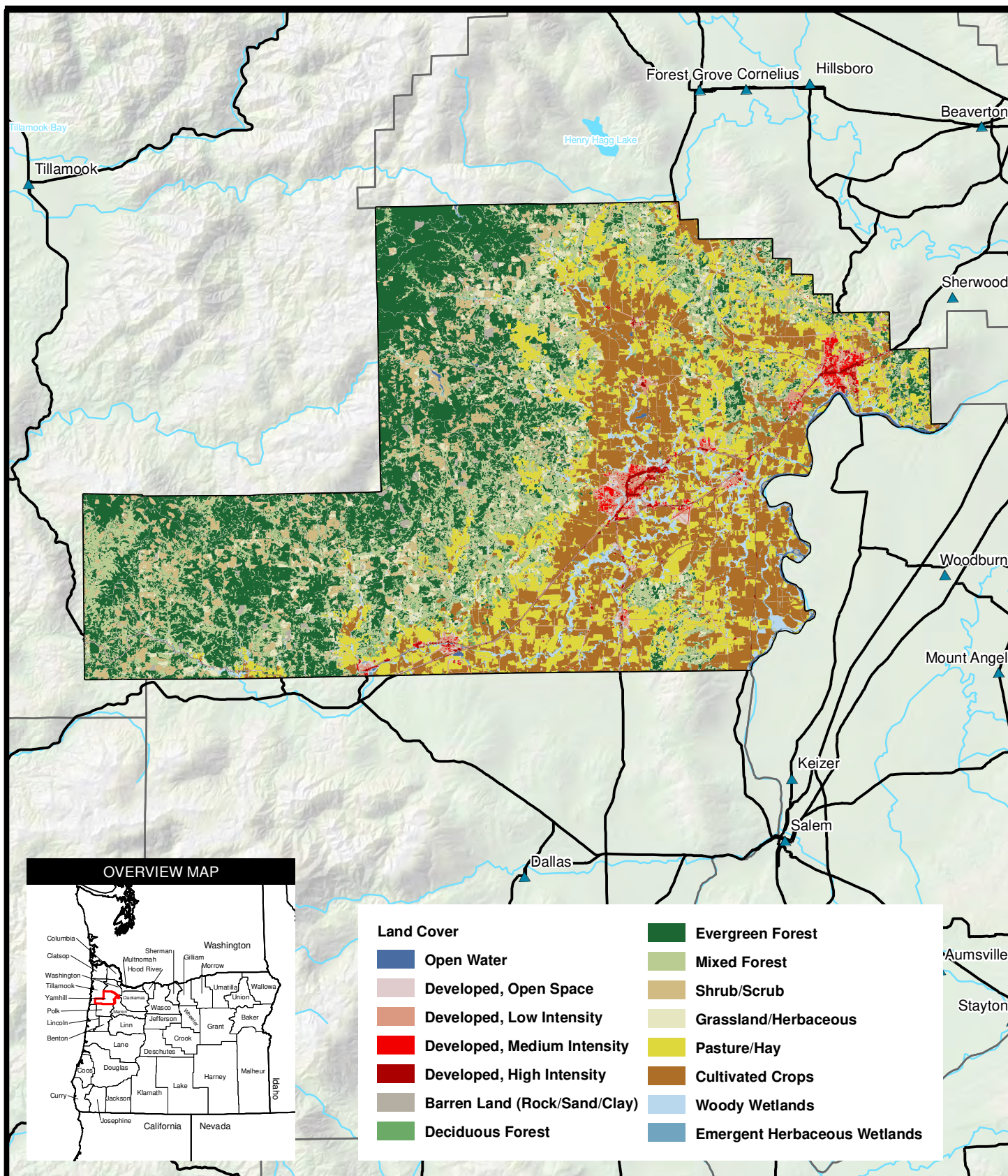
- City
- City Limits
- County Boundary
- Major Road or Highway
- Streams & Waterways
- Lakes & Waterbodies

LOCATION AND GENERAL LAND OWNERSHIP YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Ownership (FEMA), ESRI (highways 1996), USGS (counties, cities, lakes, rivers, hillshade) MAP DATA: July, 2008

FIG. NO:
K-1



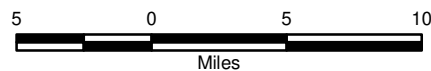
Land Cover

	Open Water		Evergreen Forest
	Developed, Open Space		Mixed Forest
	Developed, Low Intensity		Shrub/Scrub
	Developed, Medium Intensity		Grassland/Herbaceous
	Developed, High Intensity		Pasture/Hay
	Barren Land (Rock/Sand/Clay)		Cultivated Crops
	Deciduous Forest		Woody Wetlands
			Emergent Herbaceous Wetlands

LEGEND

- City
- County Boundary
- Major Road or Highway
- Streams & Waterways
- Lakes & Waterbodies

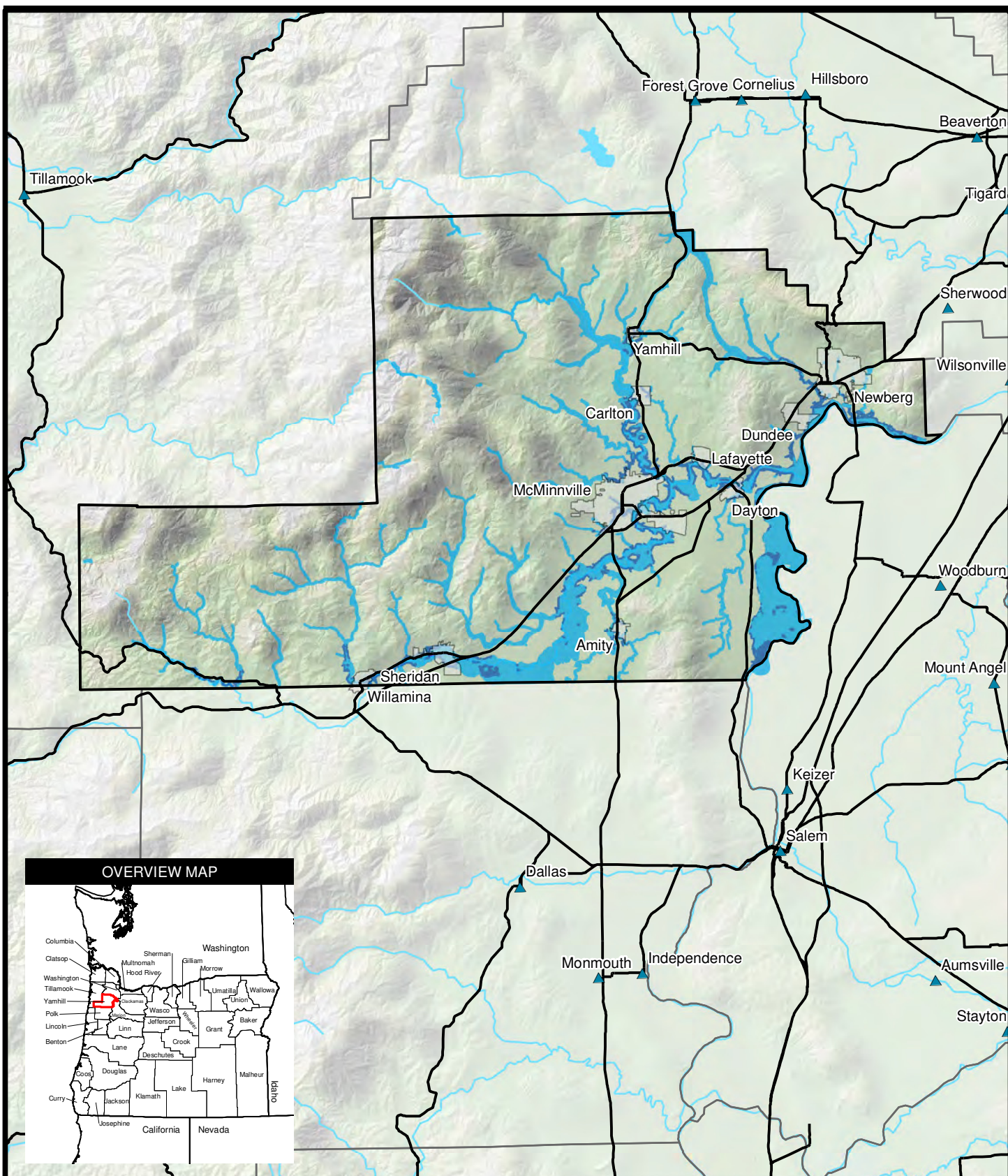
LAND COVER YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: ESRI (highways 1996), USGS (land cover, counties, cities, lakes, rivers, hillshade) MAP DATA: July, 2008



FIG. NO:
K-2



LEGEND

FLOOD ZONE

- 100-Year Flood Zone
- 500-Year Flood Zone
- Designated Floodway

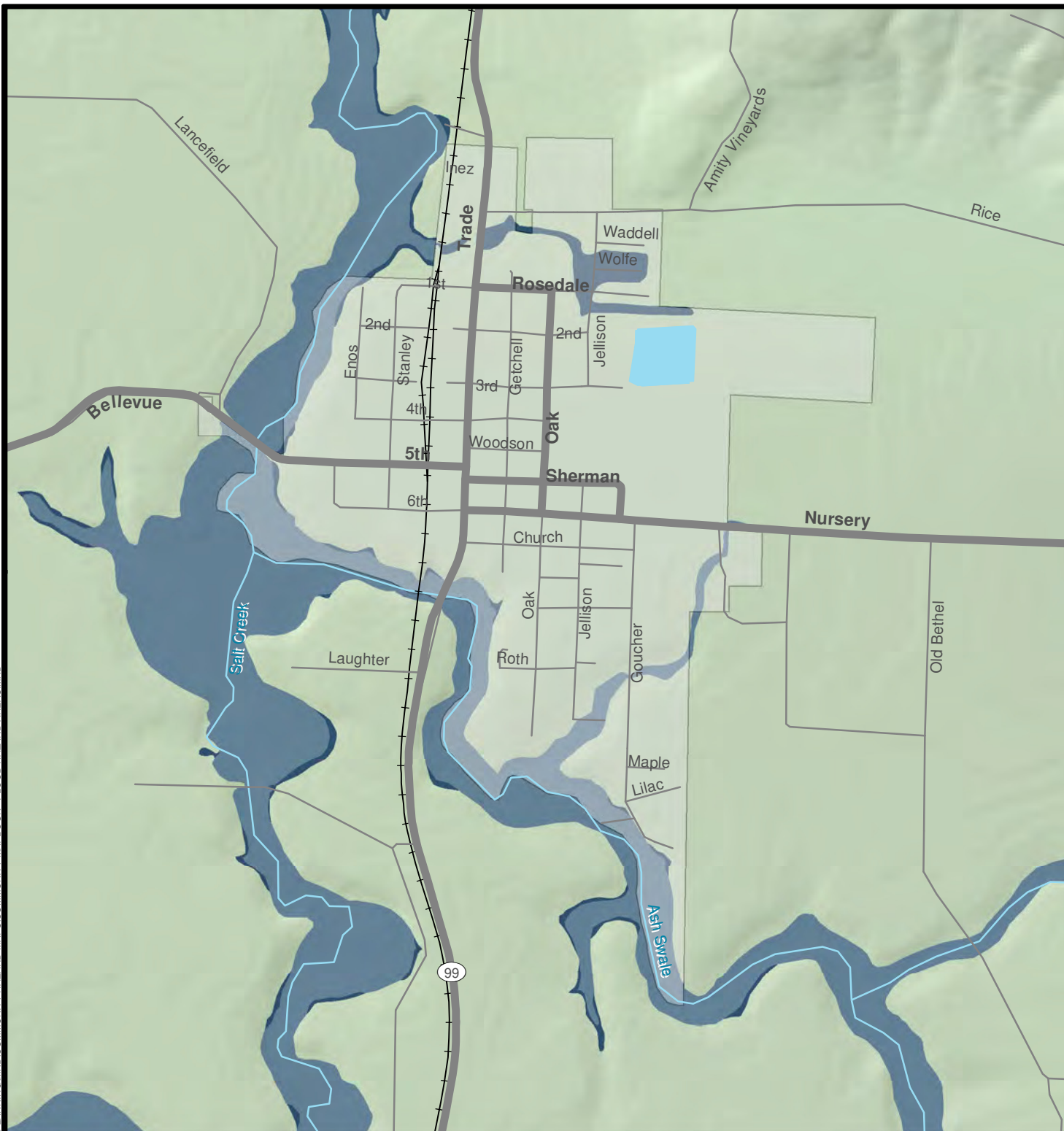
- ▲ City
- City Limits
- County Boundary
- Major Road or Highway
- ~ Streams & Waterways
- Lakes & Waterbodies

FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Flood Zones (FEMA), ESRI (highways 1996), USGS (counties, cities, lakes, rivers, hillshade) MAP DATA: July, 2008

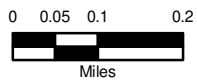
FIG. NO:
K-3



OVERVIEW MAP



CITY OF AMITY FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-3B

LEGEND

FEMA Flood Zones

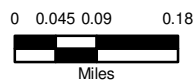
-  Designated Floodway
-  100-Year Flood Zone
-  500-Year Flood Zone
-  City Limits
-  Streets & Highways
-  Railroads
-  Lakes & Waterbodies
-  Streams & Waterways



OVERVIEW MAP



CITY OF CARLTON FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN











SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-3C

LEGEND

FEMA Flood Zones

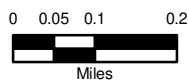
-  Designated Floodway
-  100-Year Flood Zone
-  500-Year Flood Zone
-  City Limits
-  Streets & Highways
-  Railroads
-  Lakes & Waterbodies
-  Streams & Waterways



OVERVIEW MAP



CITY OF DAYTON FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN




SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-3D

LEGEND

FEMA Flood Zones

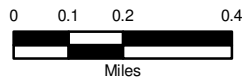
-  Designated Floodway
-  100-Year Flood Zone
-  500-Year Flood Zone
-  City Limits
-  Streets & Highways
-  Railroads
-  Lakes & Waterbodies
-  Streams & Waterways



OVERVIEW MAP



CITY OF DUNDEE FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-3E

LEGEND

FEMA Flood Zones

- Designated Floodway
- 100-Year Flood Zone
- 500-Year Flood Zone
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

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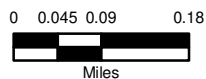


OVERVIEW MAP



CITY OF LAFAYETTE

FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-3F

LEGEND

FEMA Flood Zones

- Designated Floodway
- 100-Year Flood Zone
- 500-Year Flood Zone
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

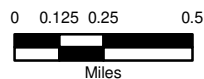


OVERVIEW MAP



CITY OF NEWBERG

FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

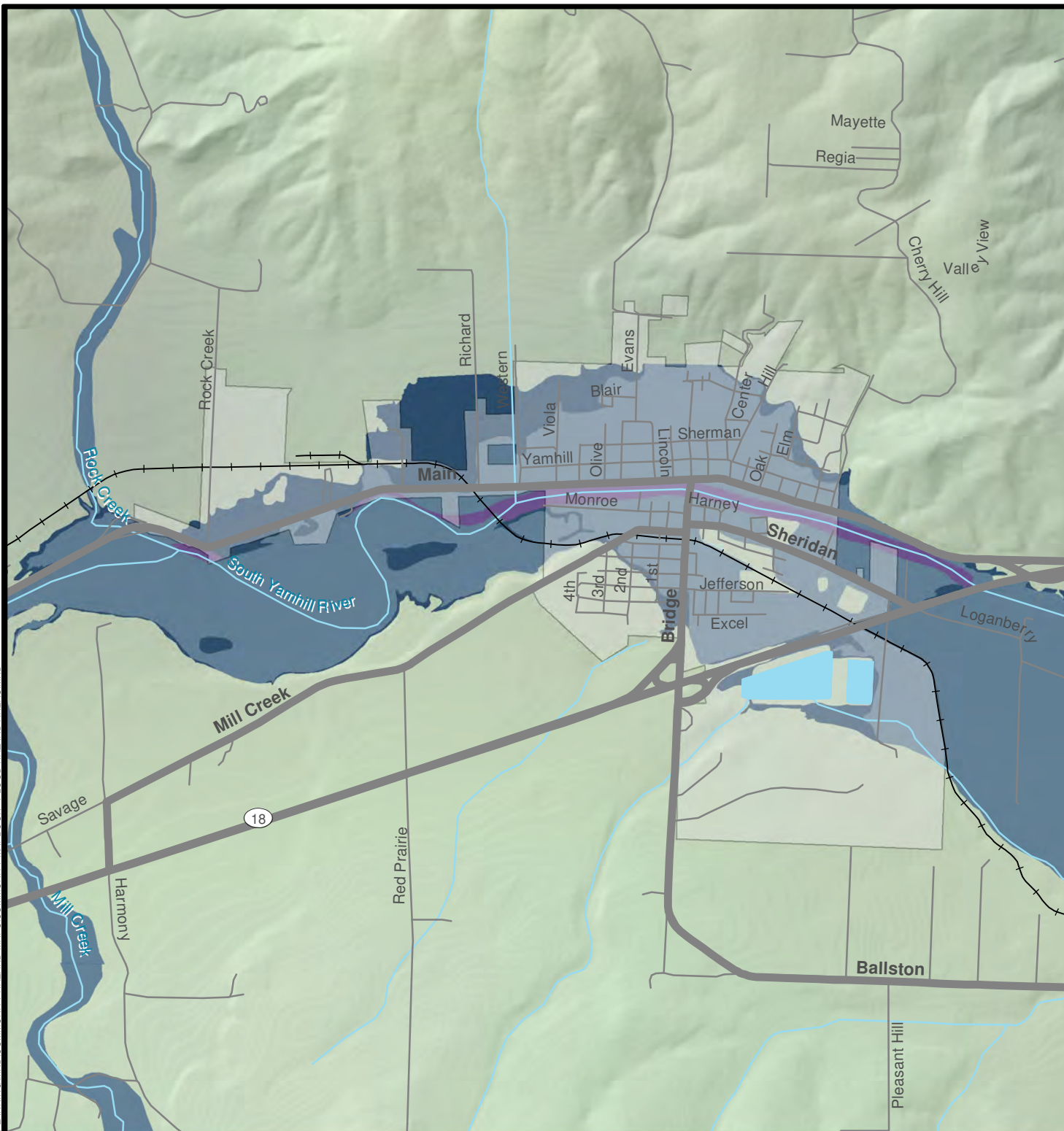


FIG. NO:
K-3G

LEGEND

FEMA Flood Zones

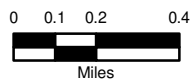
- Designated Floodway
- 100-Year Flood Zone
- 500-Year Flood Zone
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways



OVERVIEW MAP



CITY OF SHERIDAN FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

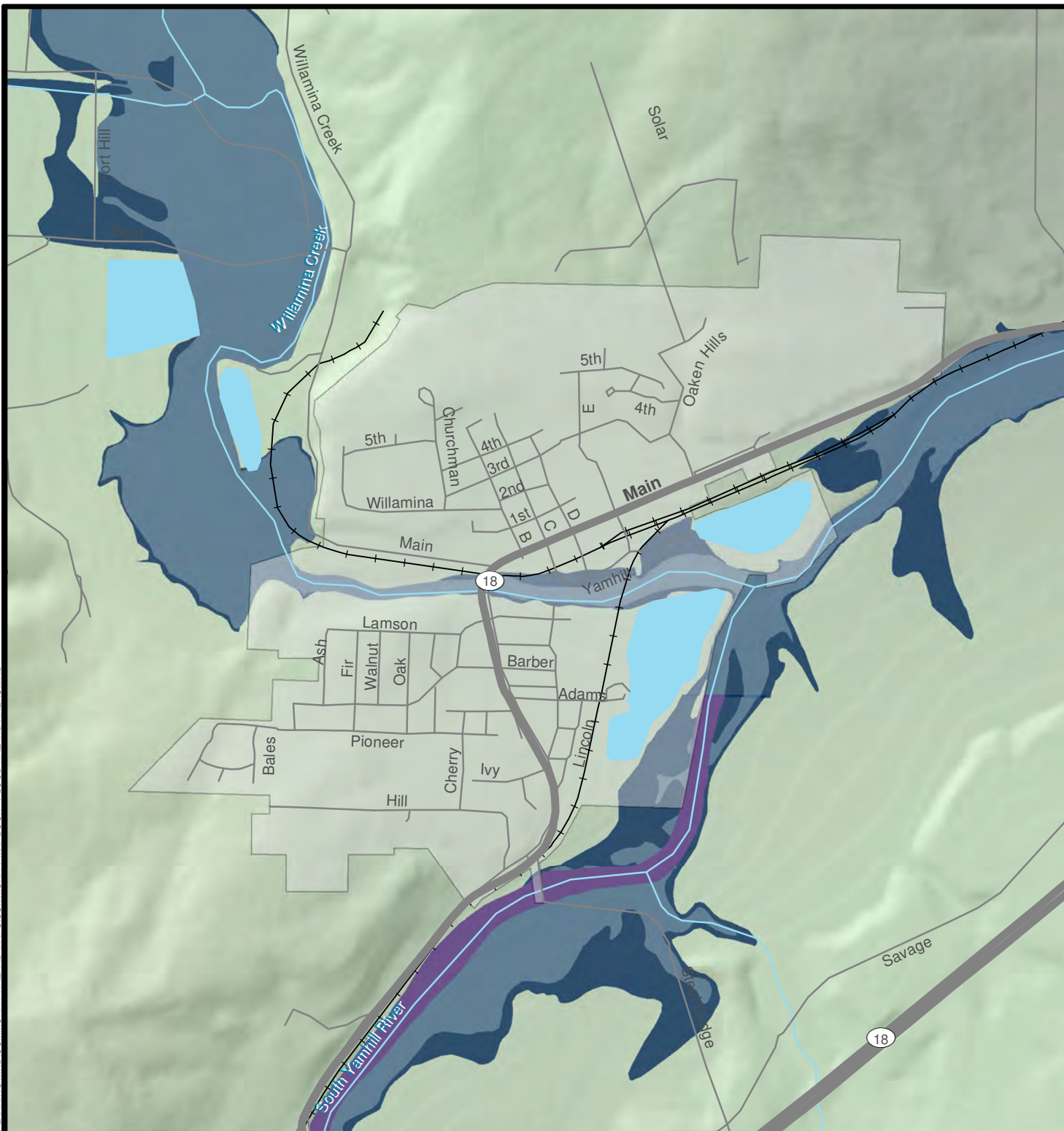


FIG. NO:
K-3H

LEGEND

FEMA Flood Zones

- Designated Floodway
- 100-Year Flood Zone
- 500-Year Flood Zone
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

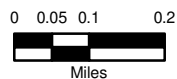


OVERVIEW MAP



CITY OF WILLAMINA

FLOOD HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

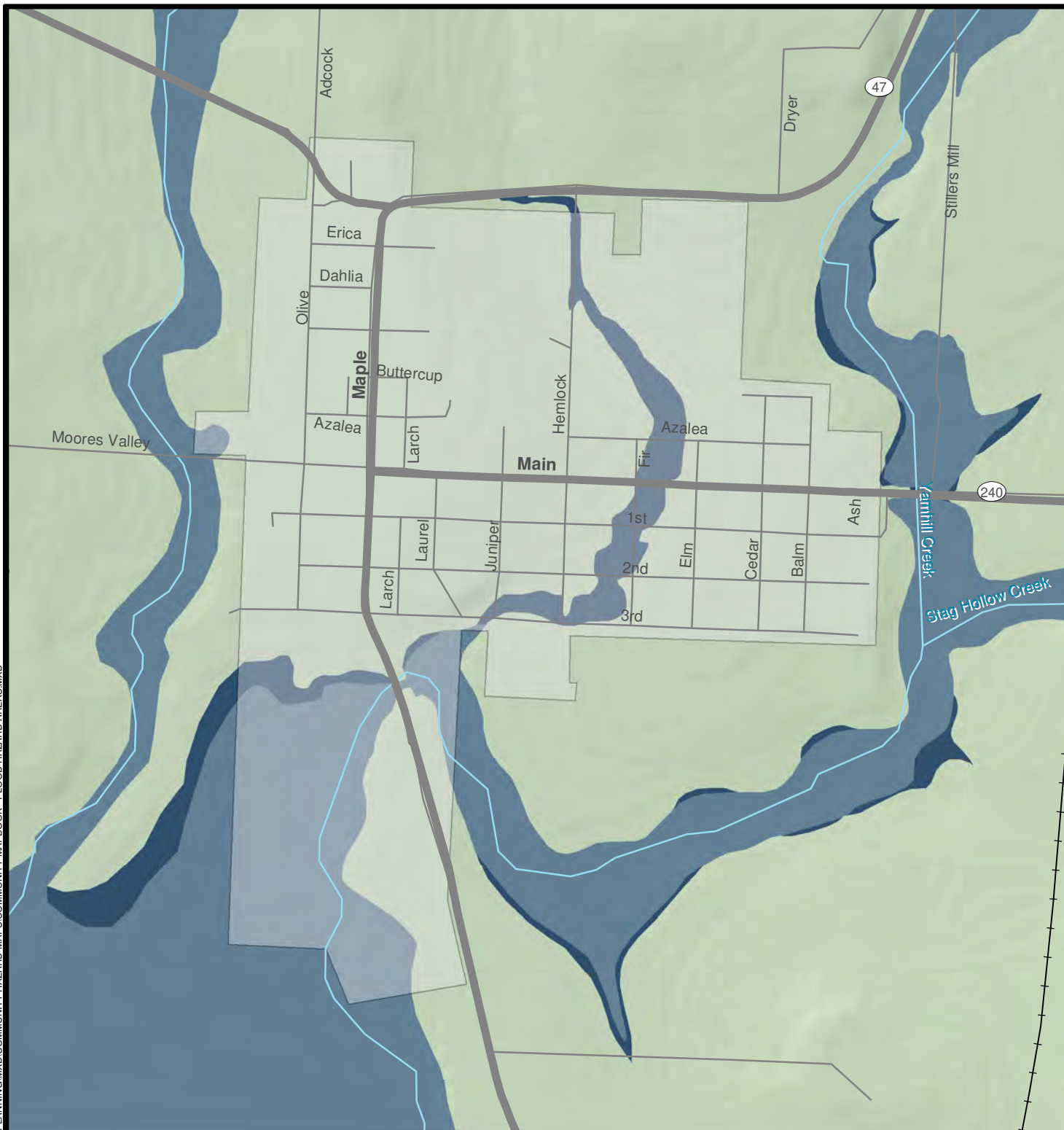


FIG. NO:
K-3I

LEGEND

FEMA Flood Zones

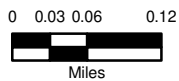
- Designated Floodway
- 100-Year Flood Zone
- 500-Year Flood Zone
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways



OVERVIEW MAP



YAMHILL CITY
FLOOD HAZARD AREA
YAMHILL COUNTY
HAZARD MITIGATION PLAN



SOURCES: Flood (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

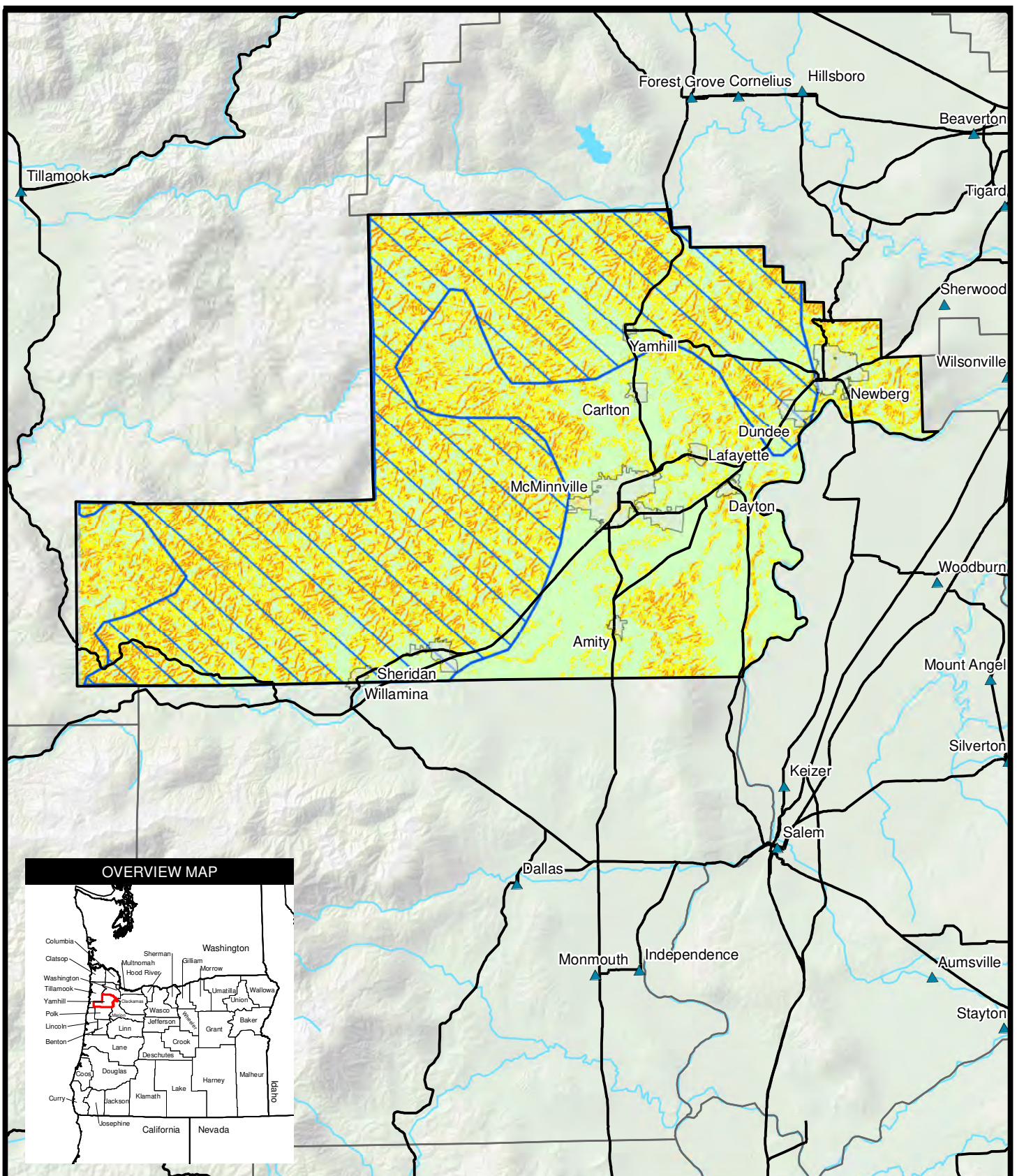


FIG. NO:
K-3J

LEGEND

FEMA Flood Zones

-  Designated Floodway
-  100-Year Flood Zone
-  500-Year Flood Zone
-  City Limits
-  Streets & Highways
-  Railroads
-  Lakes & Waterbodies
-  Streams & Waterways



LEGEND

Landslide Susceptibility

Moderate Potential

Slope Inclination Failure Hazard Area

Low (<14 degrees)

Moderate (14-32 degrees)

High (>32 degrees)

City

City Limits

County Boundary

Major Road or Highway

Streams & Waterways

Lakes & Waterbodies

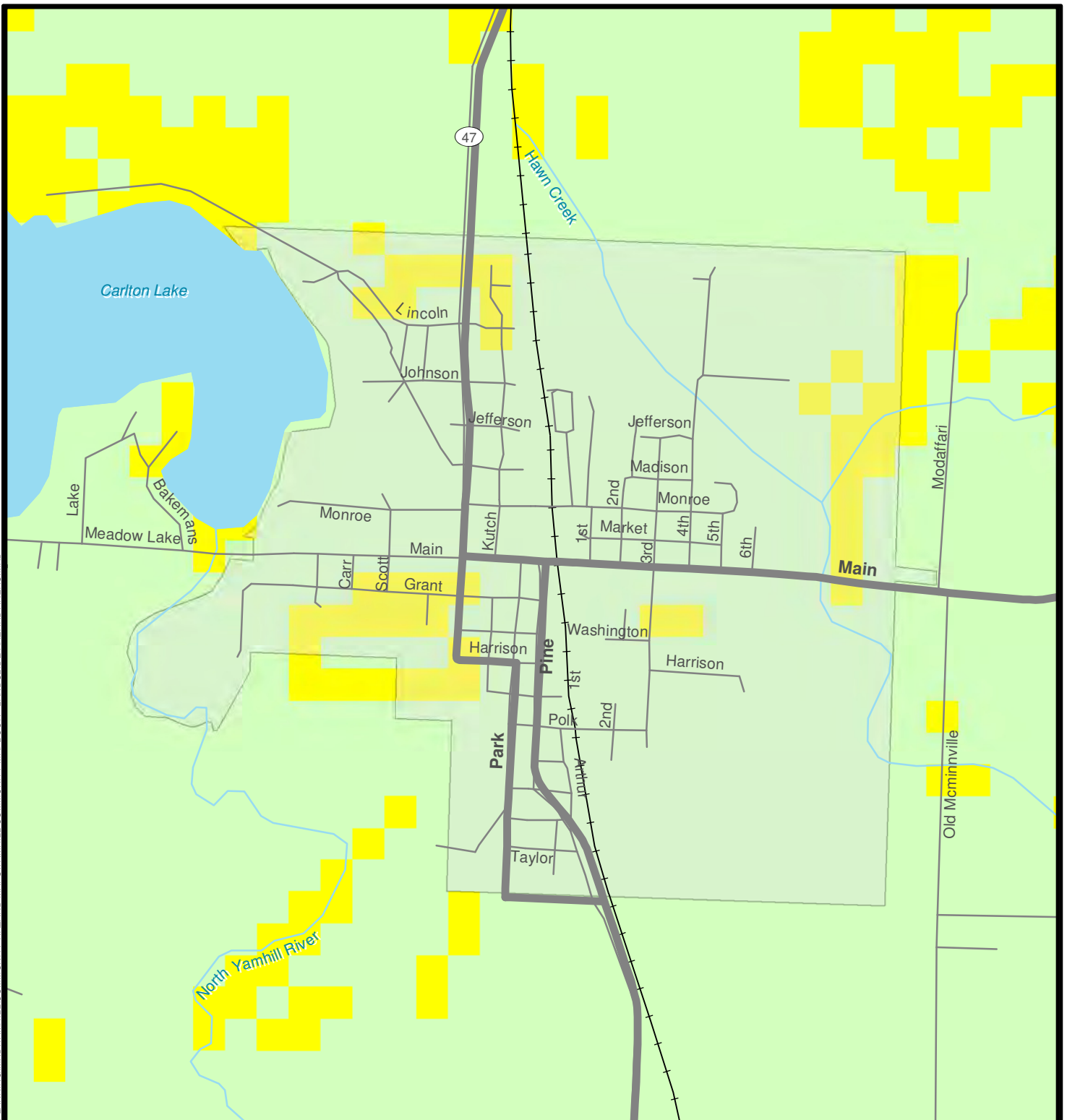
LANDSLIDE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Slope Inclination (FEMA), ESRI (highways 1996),
USGS (counties, cities, lakes, rivers, hillshade)
MAP DATA: July, 2008



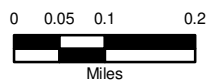
FIG. NO:
K-4



OVERVIEW MAP



CITY OF CARLTON LANDSLIDE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



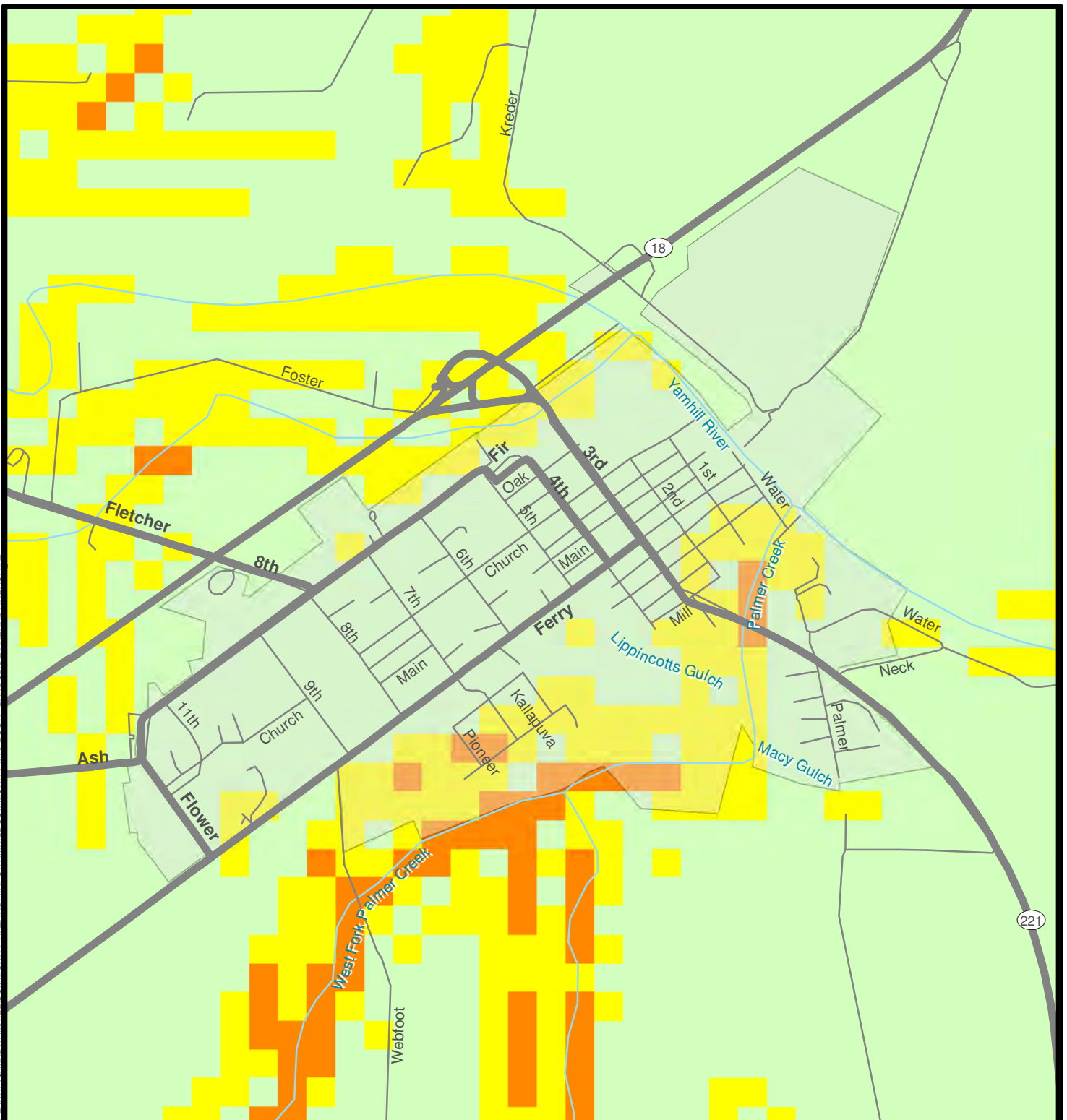
SOURCES: Landslide (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- Landslide Incidence and Susceptibility**
 - Moderate Potential
- Slope Inclination Failure Hazard Area**
 - Low (<14 degrees)
 - Moderate (14-32 degrees)
 - High (>32 degrees)
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

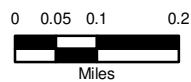
FIG. NO:
K-4B



OVERVIEW MAP



CITY OF DAYTON LANDSLIDE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Landslide (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008




FIG. NO:
K-4C


LEGEND


Landslide Incidence and Susceptibility


 Moderate Potential

Slope Inclination Failure Hazard Area

 Low (<14 degrees)


 Moderate (14-32 degrees)


 High (>32 degrees)

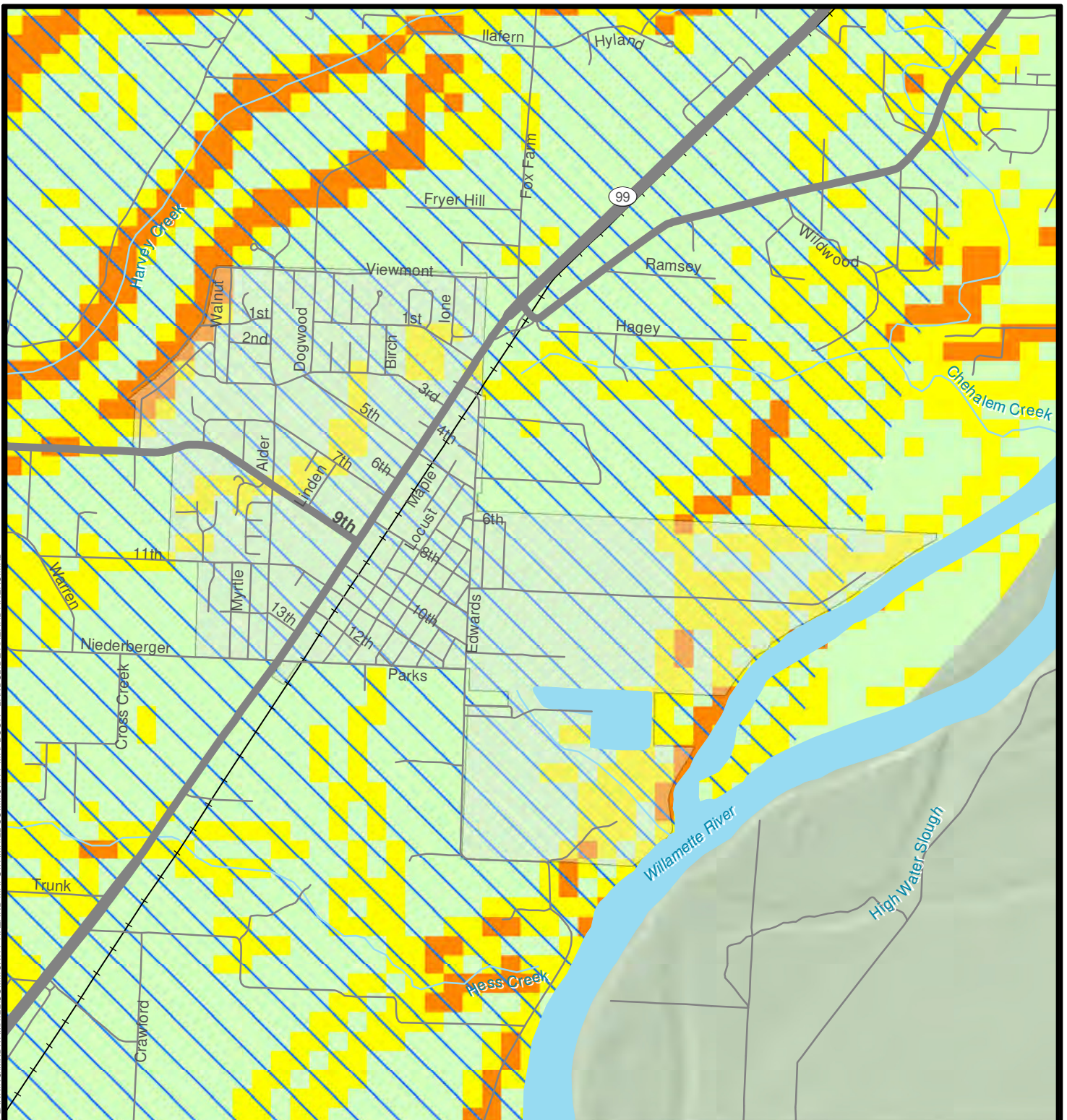
 City Limits

 Streets & Highways

 Railroads

 Lakes & Waterbodies

 Streams & Waterways



OVERVIEW MAP



CITY OF DUNDEE LANDSLIDE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN

0 0.050.1 0.2
Miles

SOURCES: Landslide (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

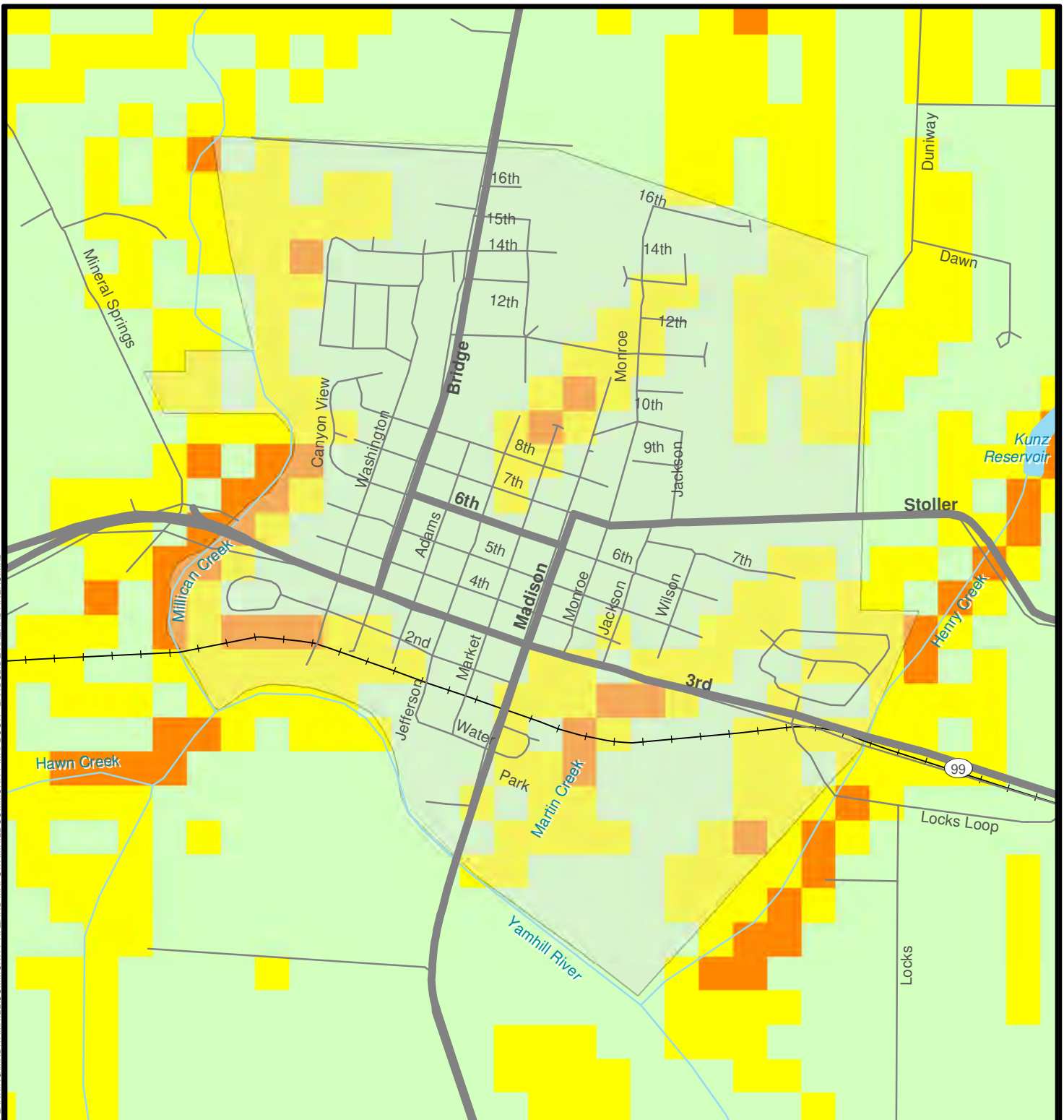


LEGEND

- Landslide Incidence and Susceptibility**
- Moderate Potential
- Slope Inclination Failure Hazard Area**
- Low (<14 degrees)
 - Moderate (14-32 degrees)
 - High (>32 degrees)
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

FIG. NO:
K-4D

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OVERVIEW MAP



CITY OF LAFAYETTE

LANDSLIDE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Landslide (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

Landslide Incidence and Susceptibility

Moderate Potential

Slope Inclination Failure Hazard Area

Low (<14 degrees)

Moderate (14-32 degrees)

High (>32 degrees)

City Limits

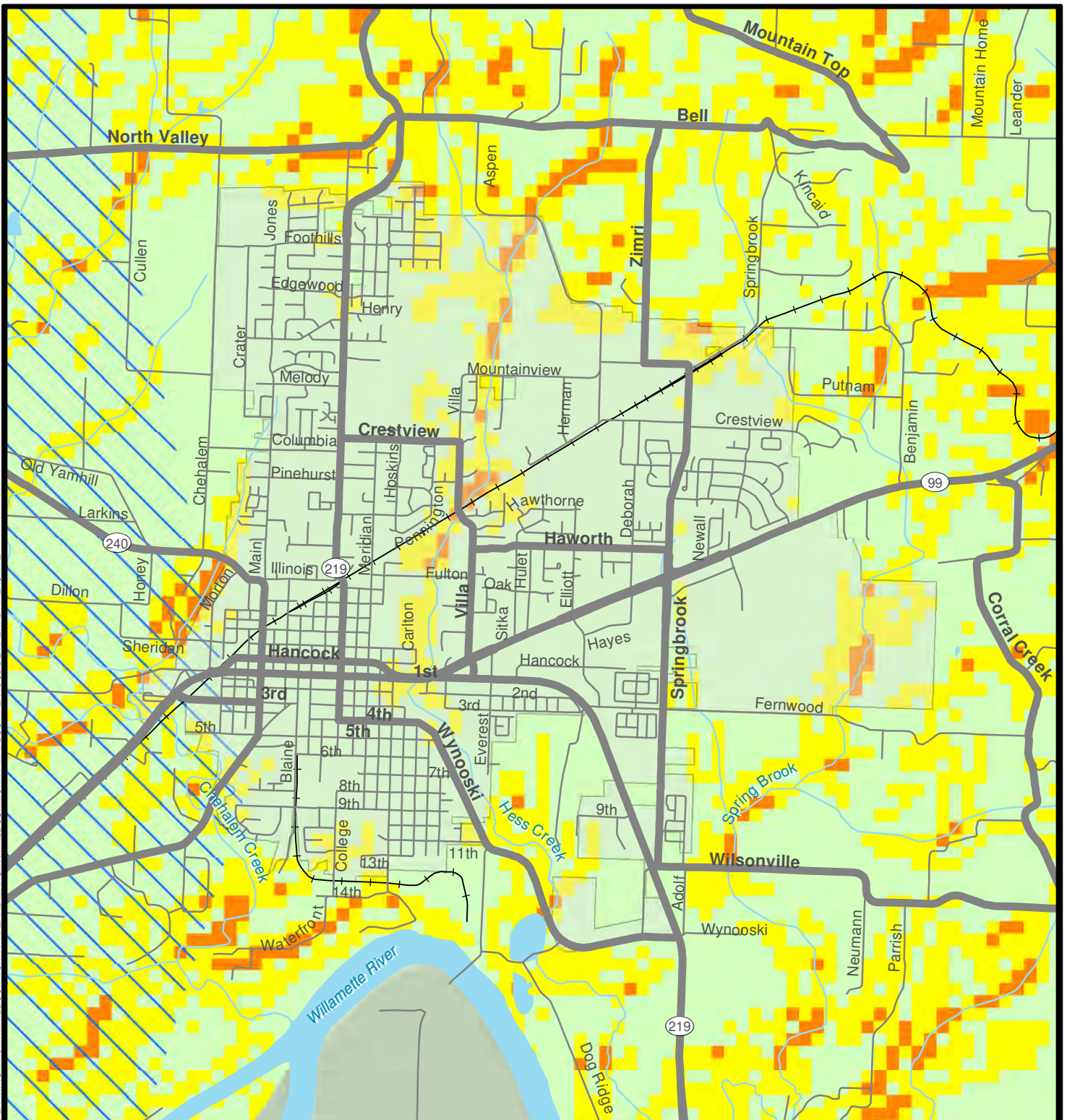
Streets & Highways

Railroads

Lakes & Waterbodies

Streams & Waterways

FIG. NO:
K-4E



OVERVIEW MAP



CITY OF NEWBERG

LANDSLIDE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Landslide (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-4F

LEGEND

Landslide Incidence and Susceptibility

Moderate Potential

Slope Inclination Failure Hazard Area

Low (<14 degrees)

Moderate (14-32 degrees)

High (>32 degrees)

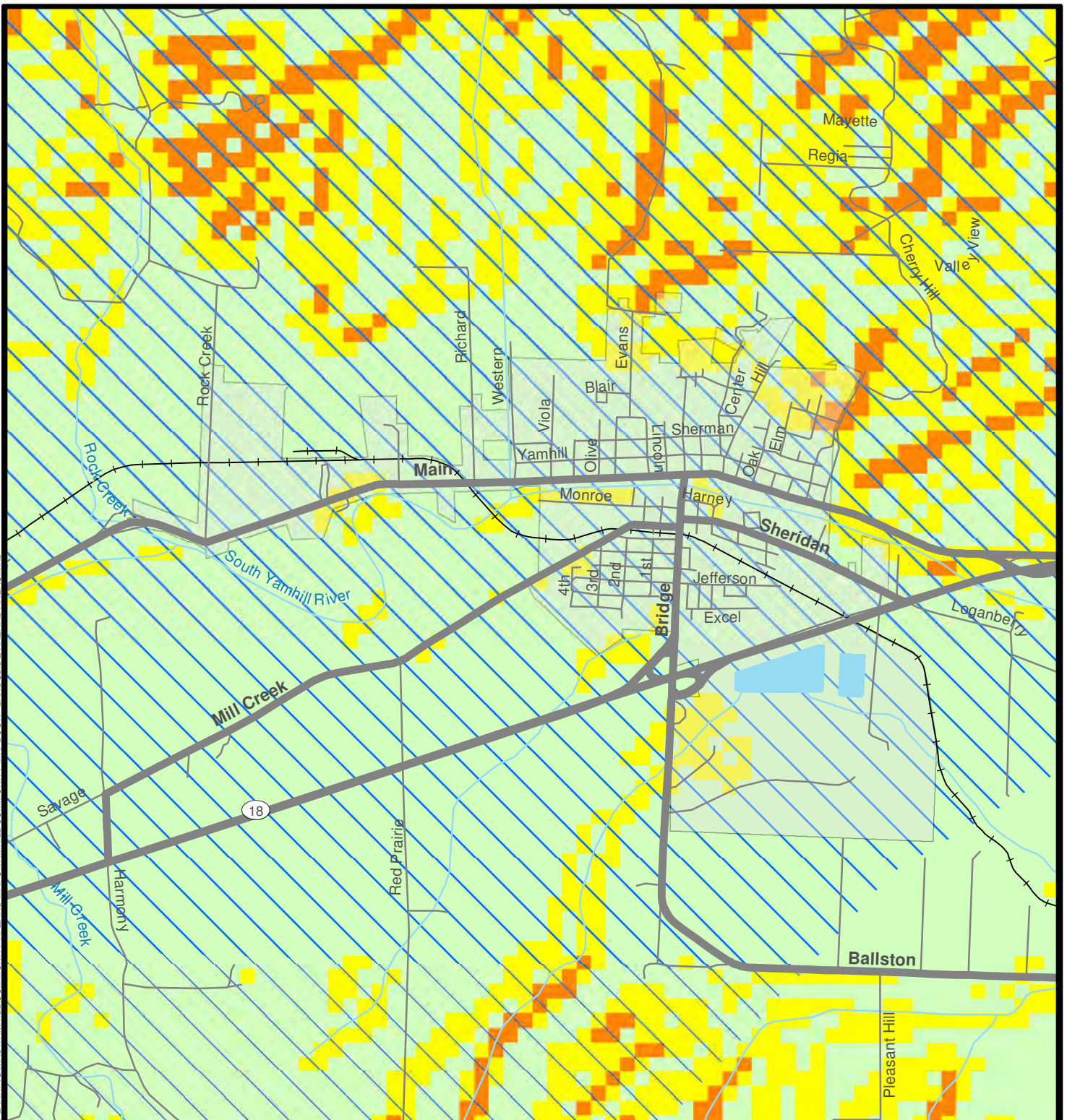
City Limits

Streets & Highways

Railroads

Lakes & Waterbodies

Streams & Waterways



OVERVIEW MAP



CITY OF SHERIDAN

LANDSLIDE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN

0.0 0.05 0.1
Miles

SOURCES: Landslide (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-4G

LEGEND

Landslide Incidence and Susceptibility

Moderate Potential

Slope Inclination Failure Hazard Area

Low (<14 degrees)

Moderate (14-32 degrees)

High (>32 degrees)

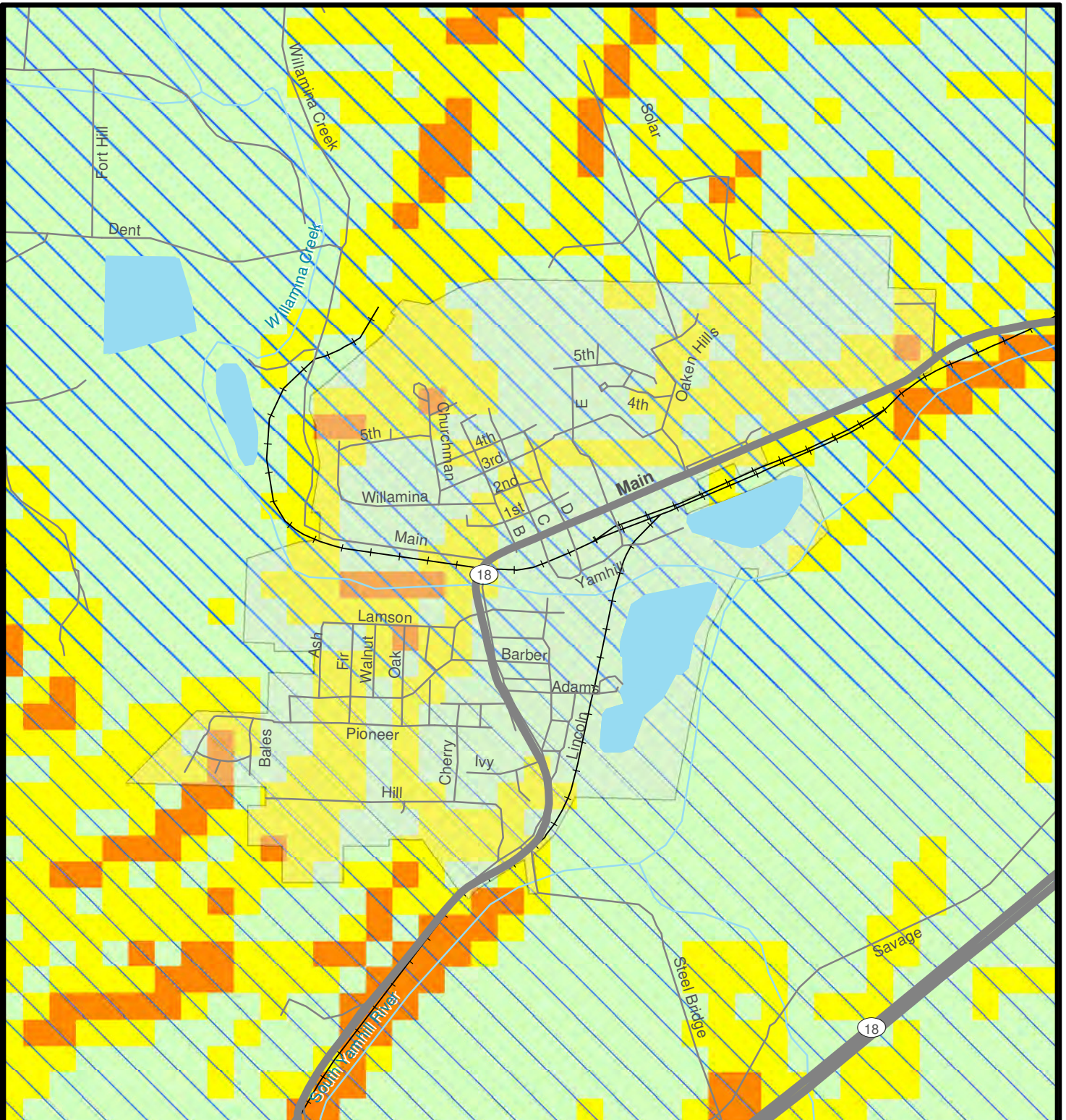
City Limits

Streets & Highways

Railroads

Lakes & Waterbodies

Streams & Waterways



OVERVIEW MAP



CITY OF WILLAMINA

LANDSLIDE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN

0.02505 0.1
Miles

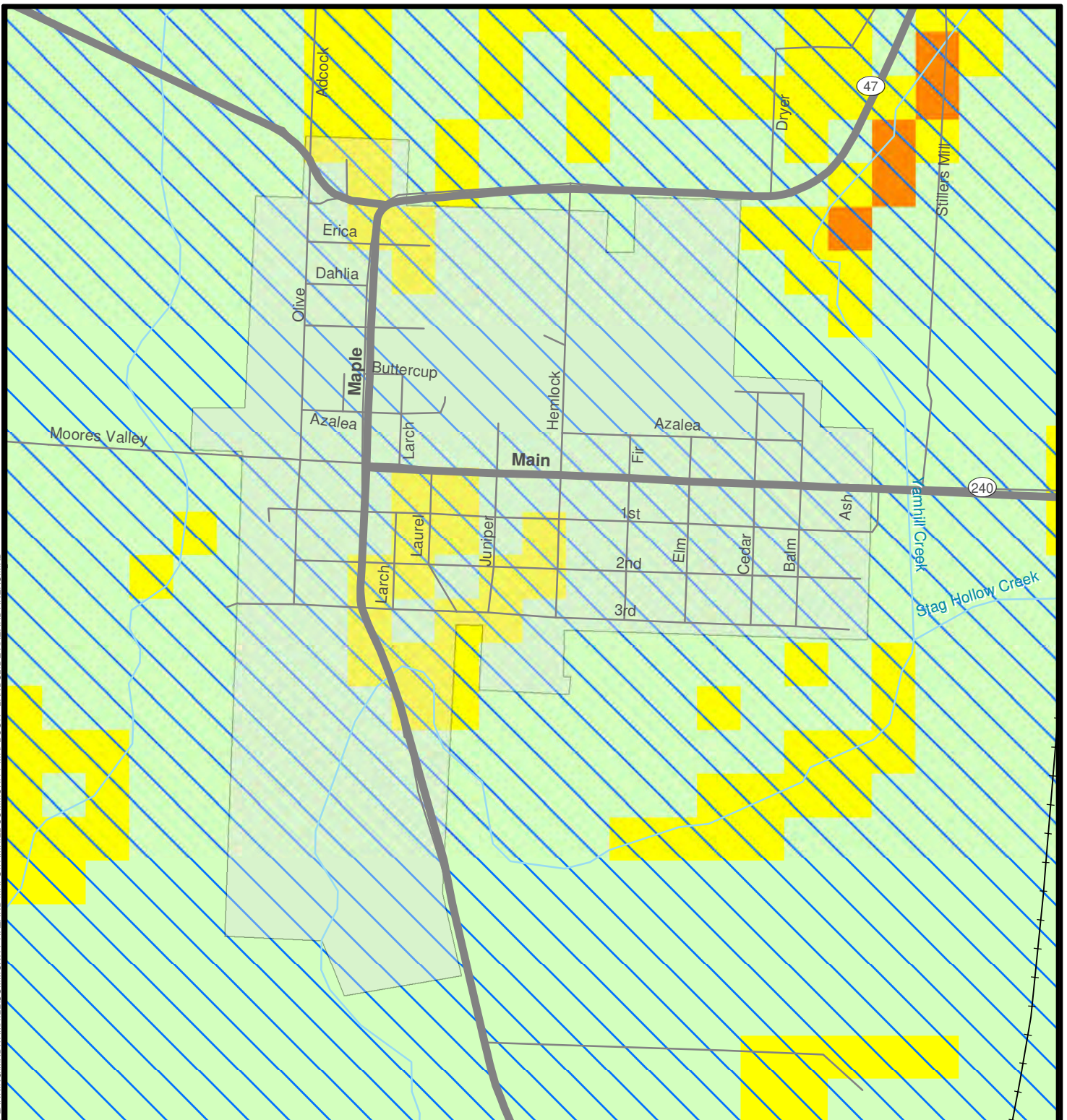
SOURCES: Landslide (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- Landslide Incidence and Susceptibility**
- Moderate Potential
- Slope Inclination Failure Hazard Area**
- Low (<14 degrees)
 - Moderate (14-32 degrees)
 - High (>32 degrees)
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

FIG. NO:
K-4H



OVERVIEW MAP



YAMHILL CITY LANDSLIDE HAZARD AREA HAZARD MITIGATION PLAN

0.0625 0.06
Miles

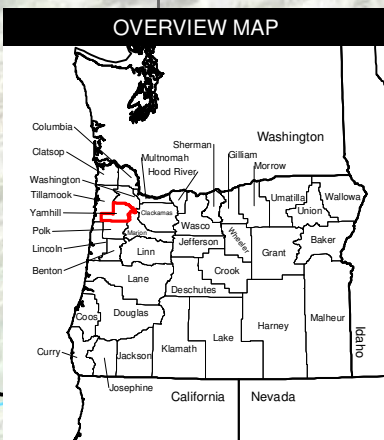
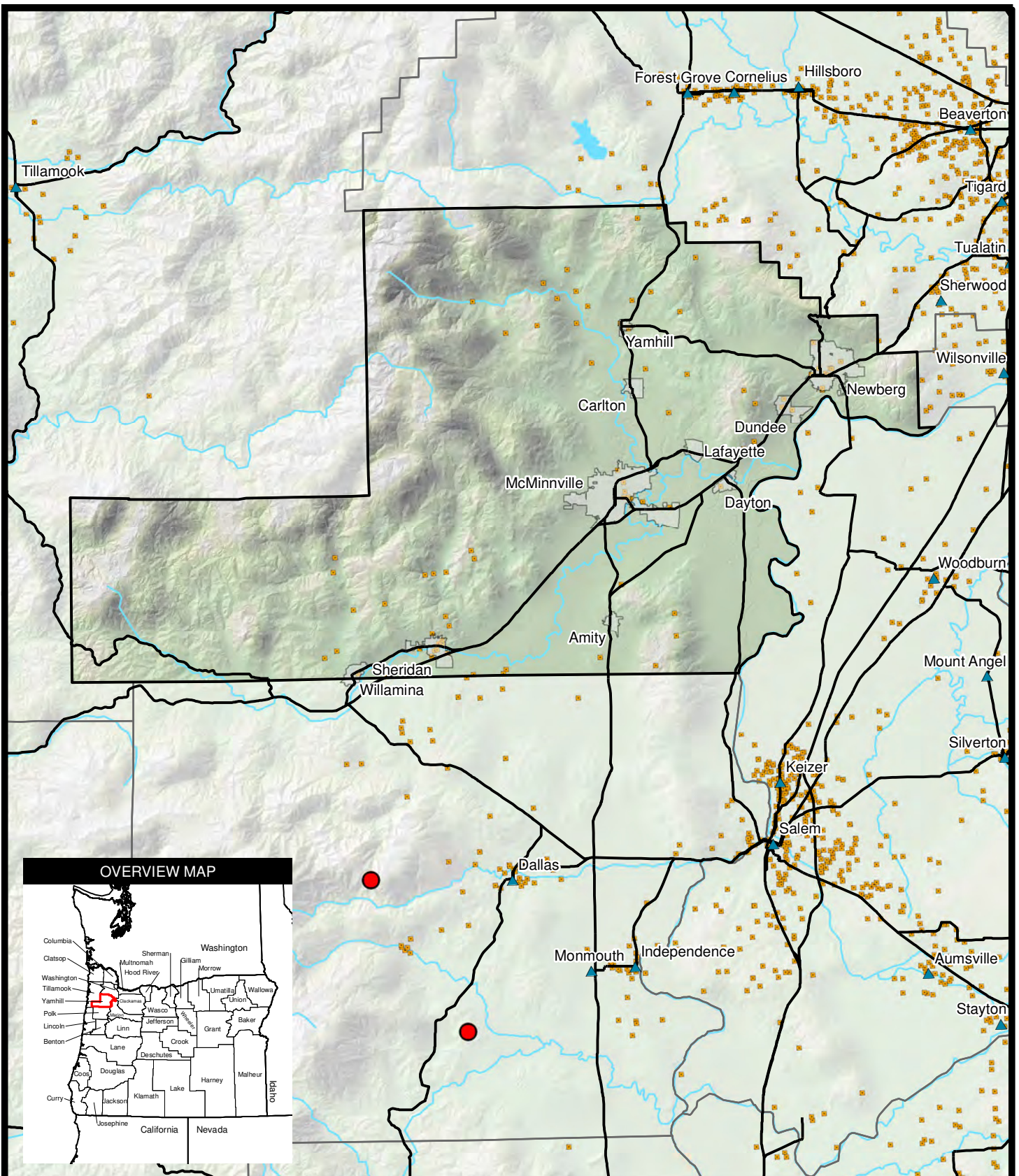
SOURCES: Landslide (FEMA), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- Landslide Incidence and Susceptibility**
- Moderate Potential
- Slope Inclination Failure Hazard Area**
- Low (<14 degrees)
 - Moderate (14-32 degrees)
 - High (>32 degrees)
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

FIG. NO:
K-41



LEGEND

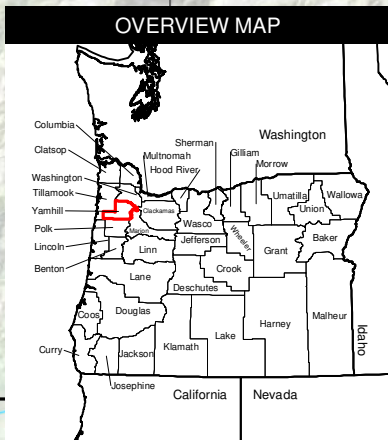
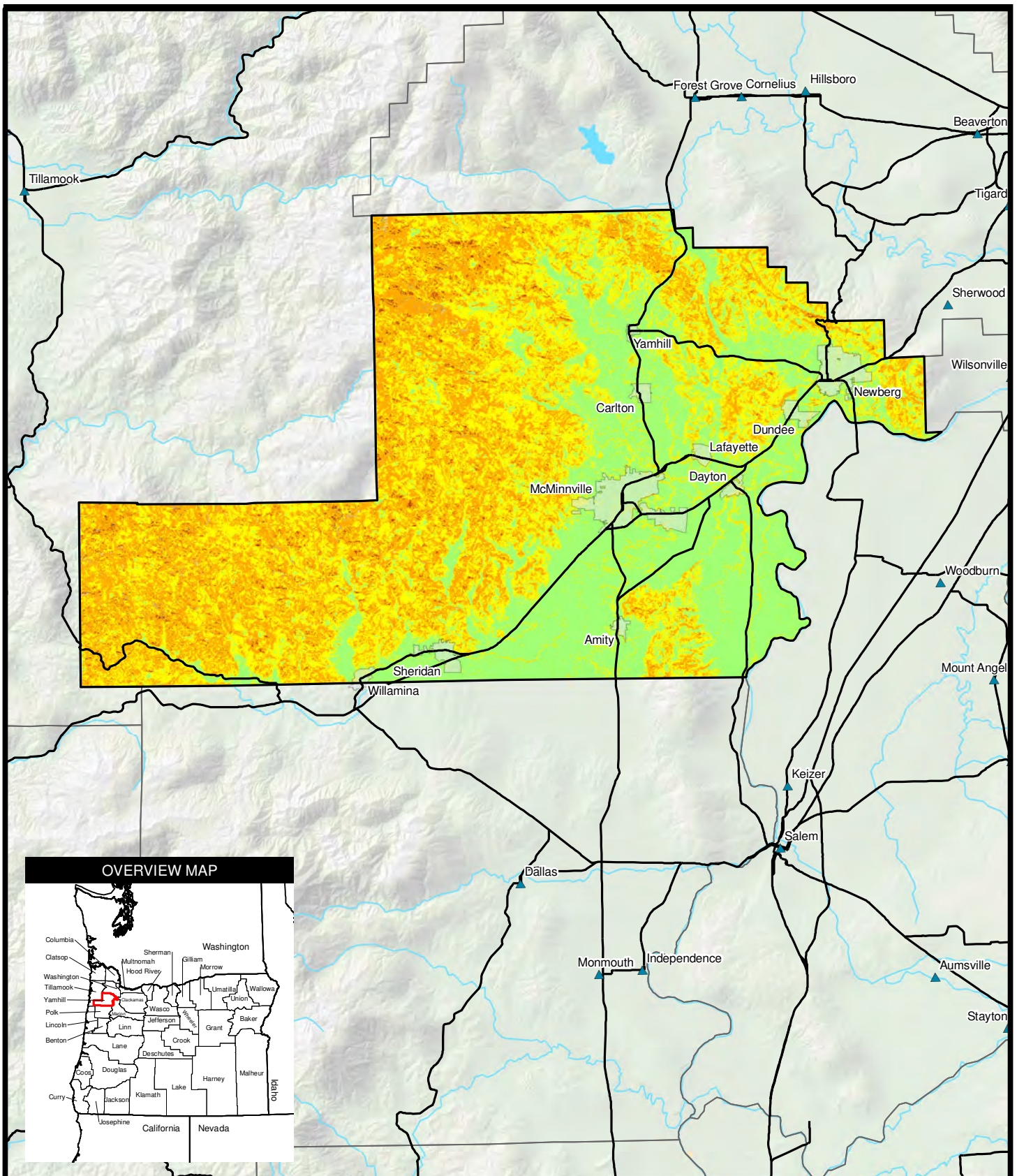
- Local Reported Fires (1996-2003)
- State Reported Fires (1962-2004)
- ▭ City Limits
- ▭ County Boundary
- ▲ City
- Major Road or Highway
- Streams & Waterways
- Lakes & Waterbodies

**HISTORIC FIRES
YAMHILL COUNTY
HAZARD MITIGATION PLAN**



SOURCES: Fire (Oregon), ESRI (highways 1996), USGS (counties, cities, lakes, rivers, hillshade) MAP DATA: July, 2008

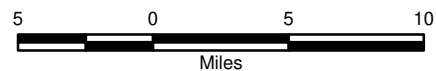
**FIG. NO:
K-5**



LEGEND

- | | |
|--|--|
| Wildland Fire Risk | ▲ City |
| Moderate | City Limits |
| High | County Boundary |
| Very High | Major Road or Highway |
| Extreme | Lakes & Waterbodies |
| | Streams & Waterways |

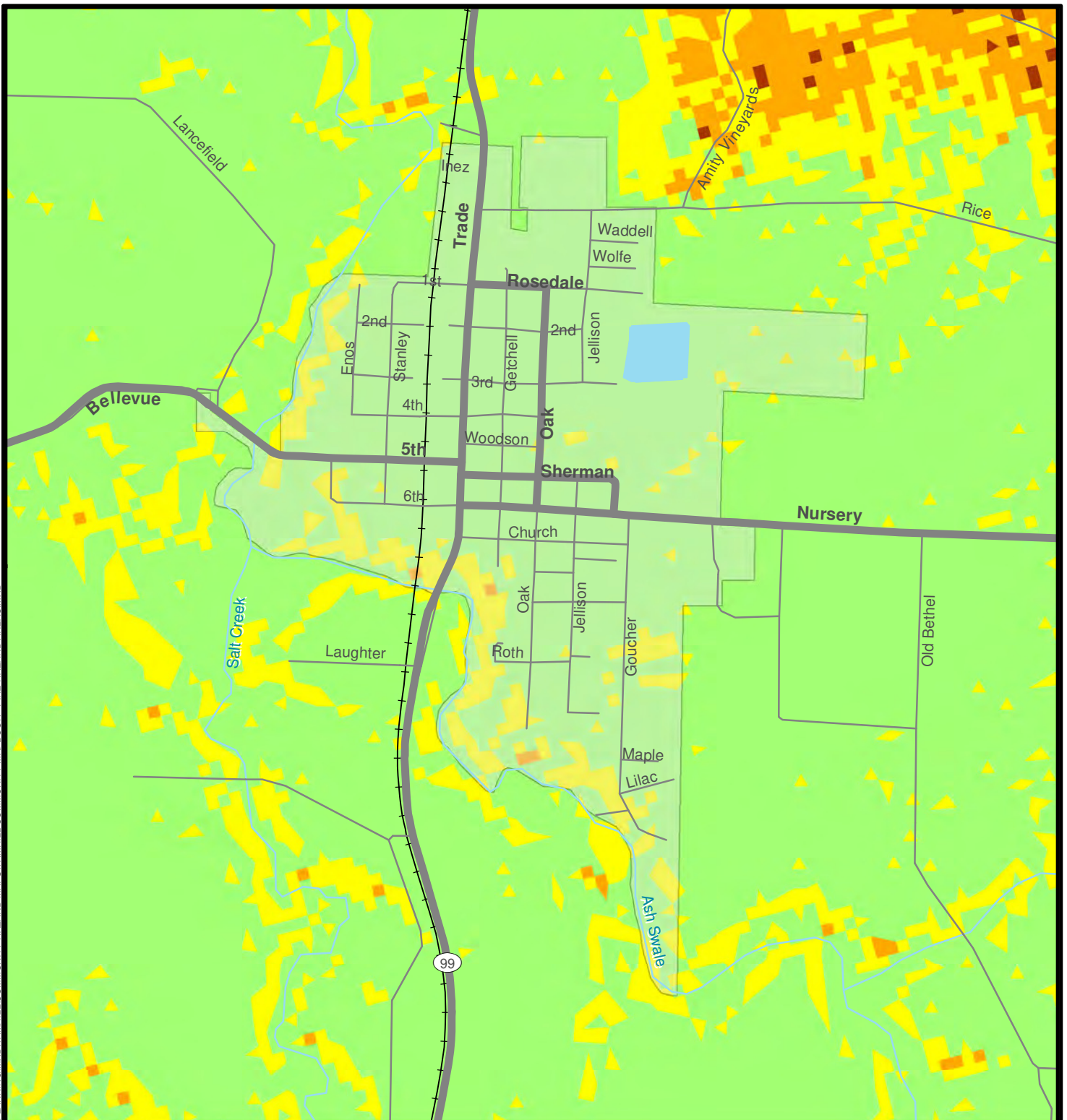
WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: ESRI (highways 1996), USGS (wildland fire, counties, cities, lakes, rivers, hillshade) MAP DATA: July, 2008



FIG. NO:
K-6

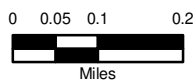


OVERVIEW MAP



CITY OF AMITY

WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

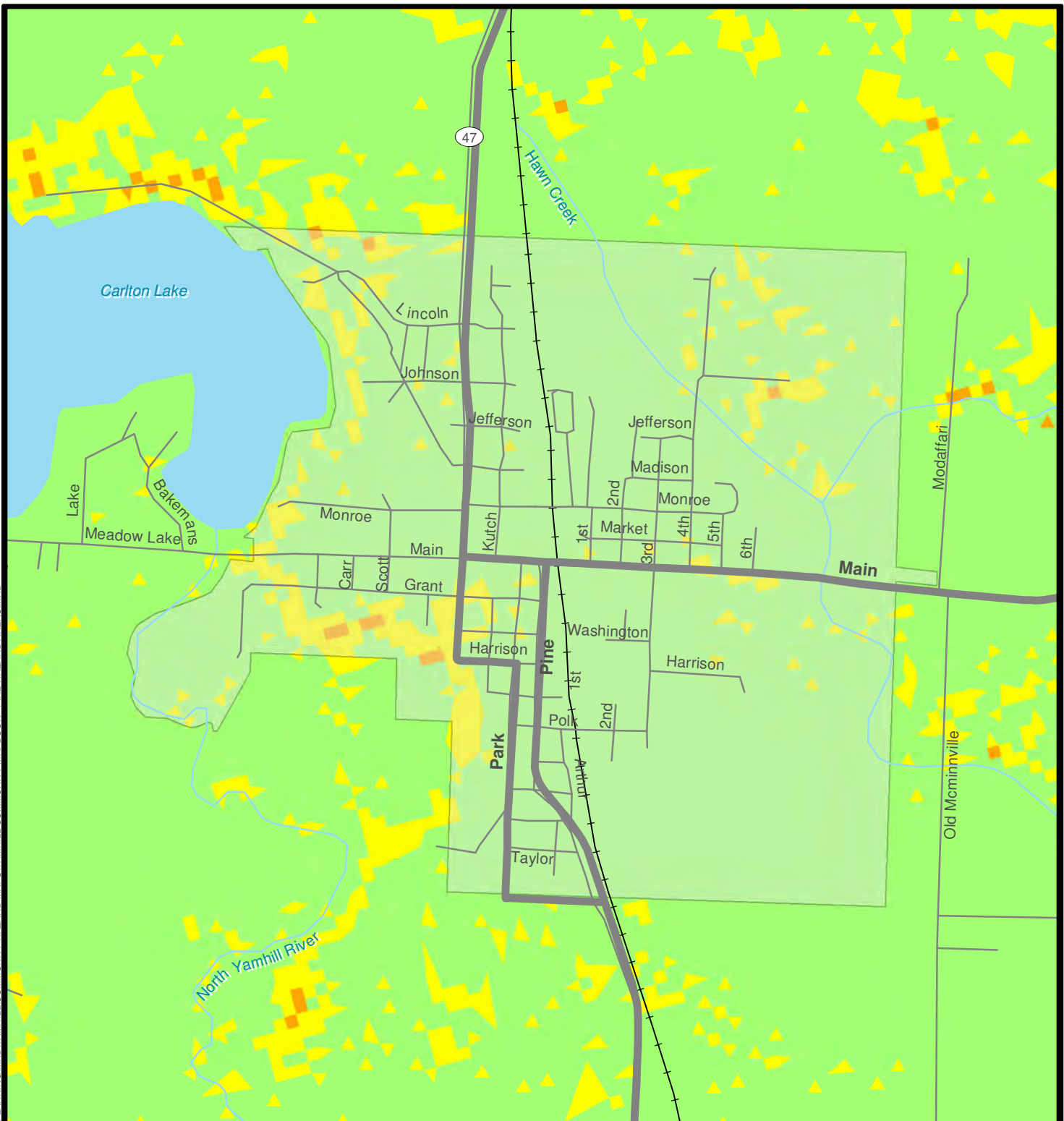


FIG. NO:
K-6B

LEGEND

Wildland Fire Risk

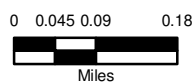
- Moderate
- High
- Very High
- Extreme
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways



OVERVIEW MAP



CITY OF CARLTON WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



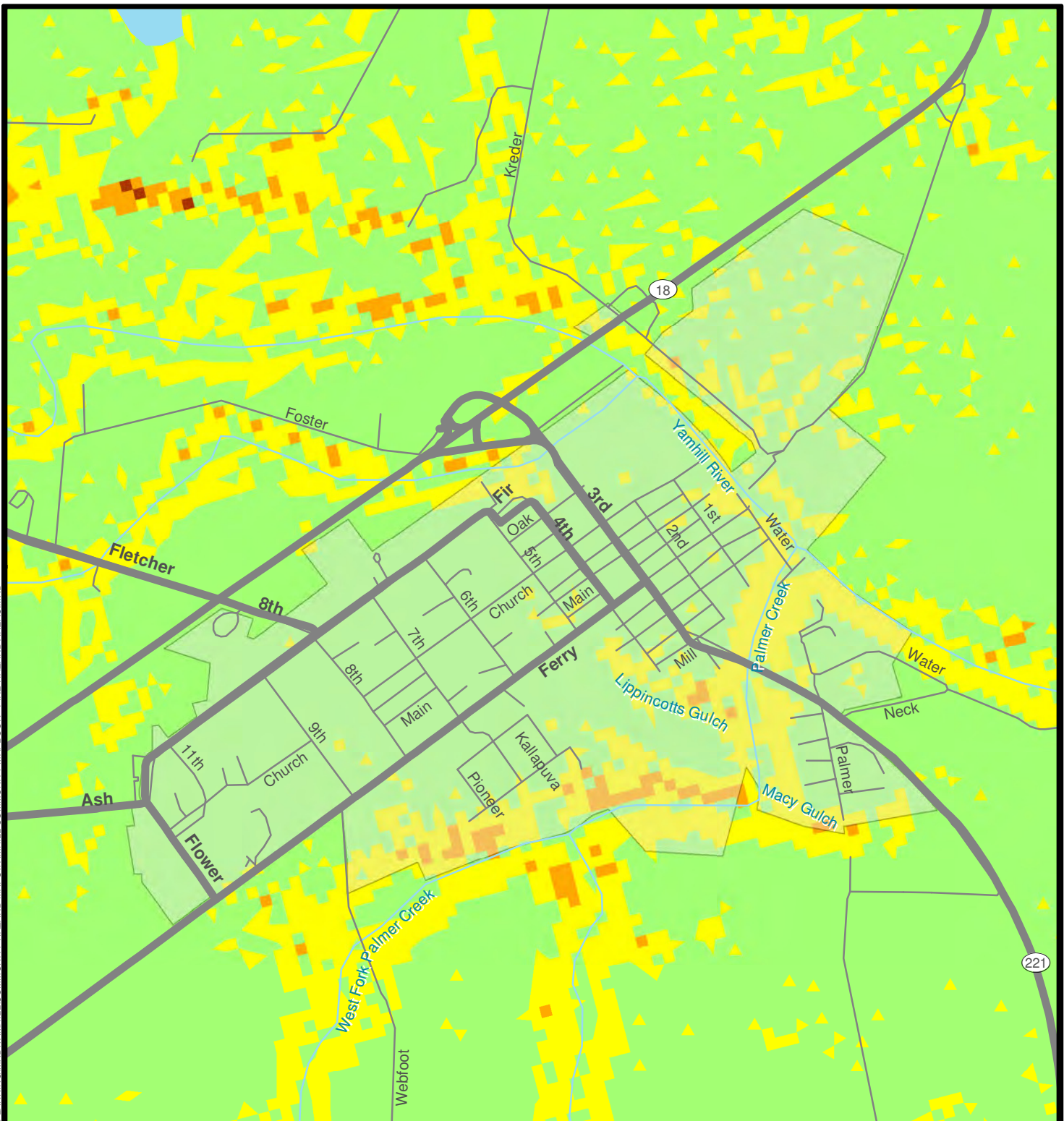
FIG. NO:
K-6C

LEGEND

Wildland Fire Risk

- Moderate
- High
- Very High
- Extreme
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

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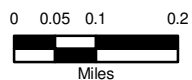


OVERVIEW MAP



CITY OF DAYTON

WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

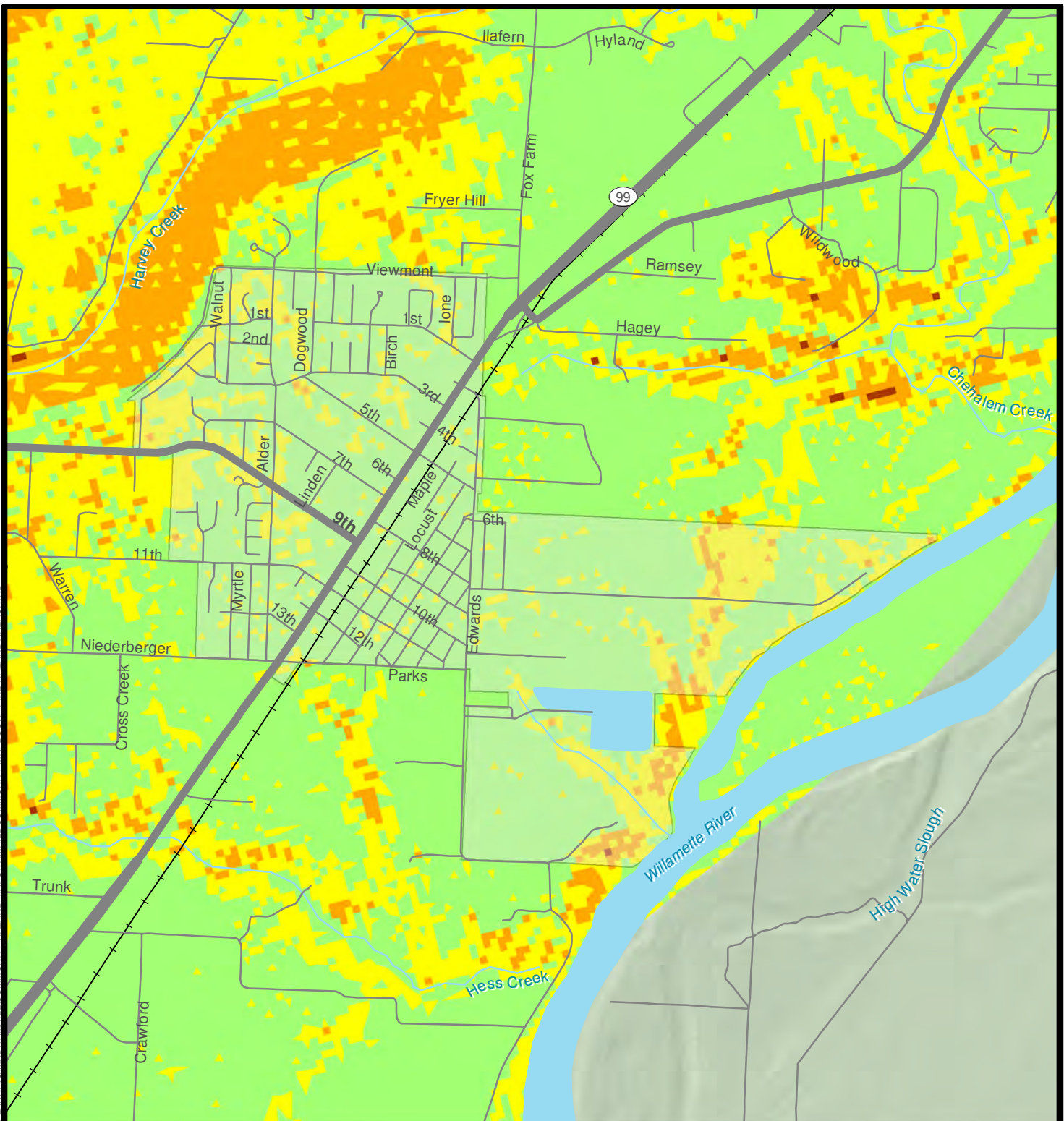


FIG. NO:
K-6D

LEGEND

Wildland Fire Risk

- Moderate
- High
- Very High
- Extreme
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways



OVERVIEW MAP



CITY OF DUNDEE

WILDLAND FIRE HAZARD AREA
YAMHILL COUNTY
HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



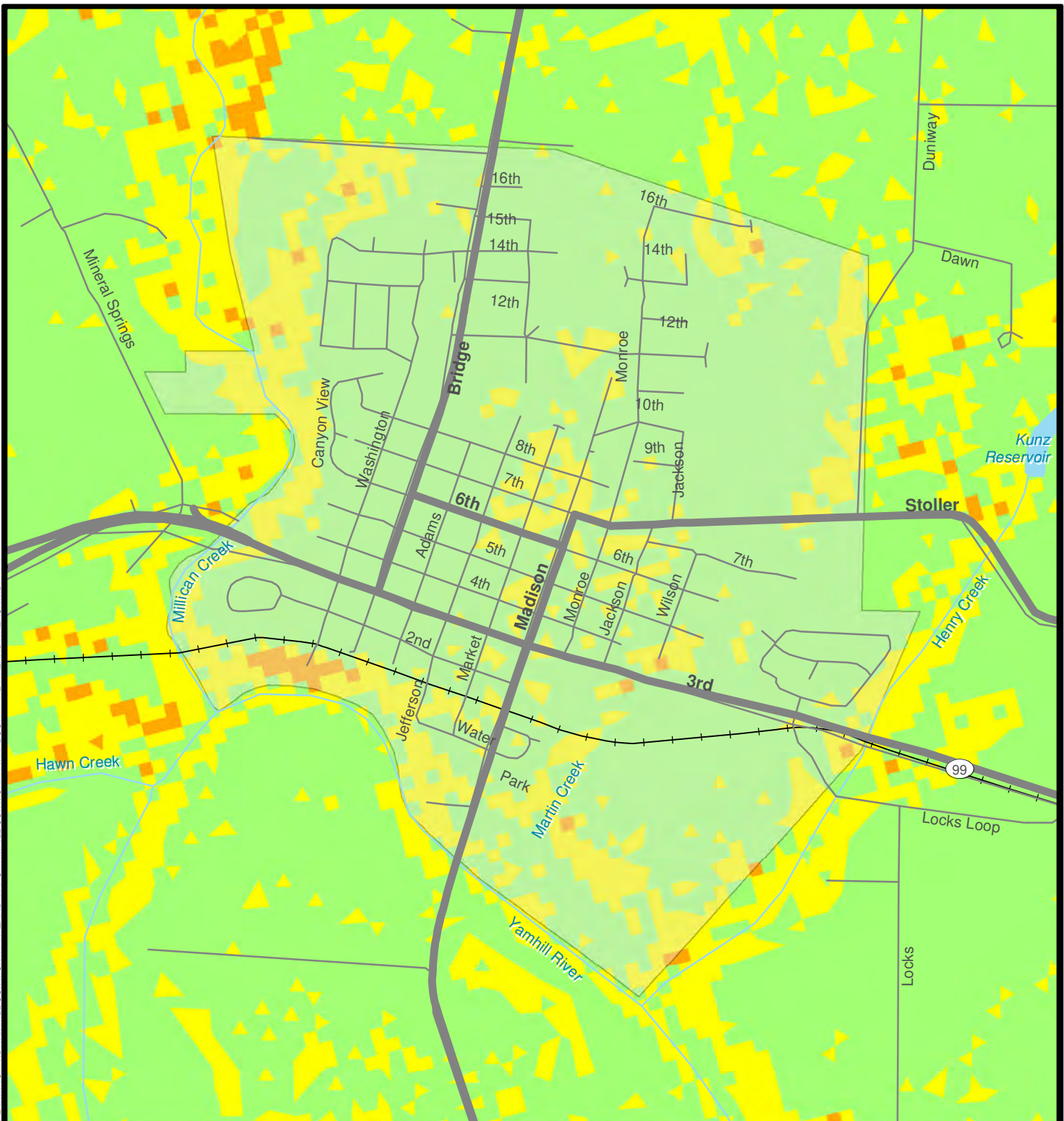
FIG. NO:
K-6E

LEGEND

Wildland Fire Risk

- Moderate
- High
- Very High
- Extreme
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

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OVERVIEW MAP



CITY OF LAFAYETTE

WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

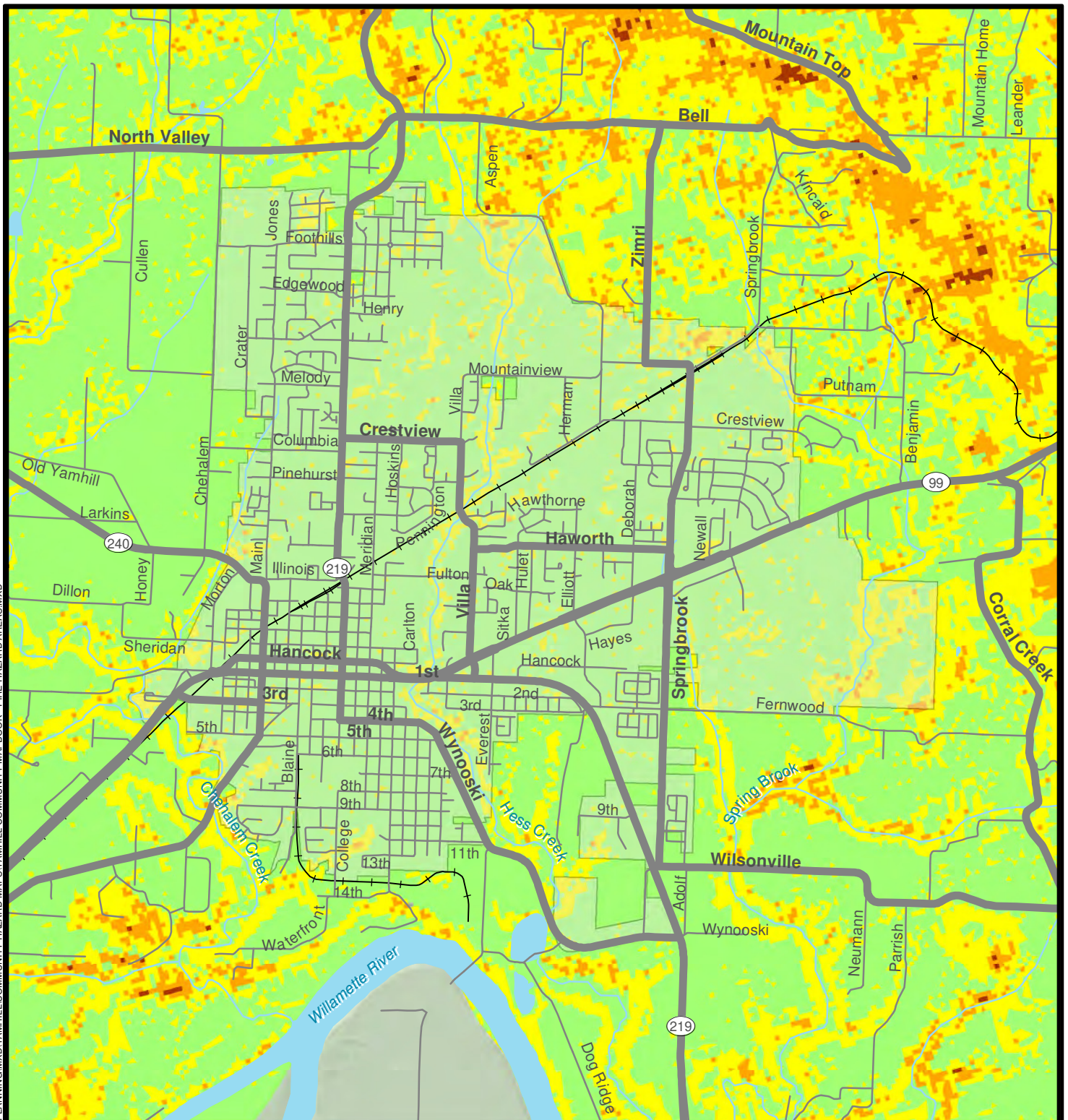


FIG. NO:
K-6F

LEGEND

Wildland Fire Risk

- Moderate
- High
- Very High
- Extreme
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways



OVERVIEW MAP



CITY OF NEWBERG

WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



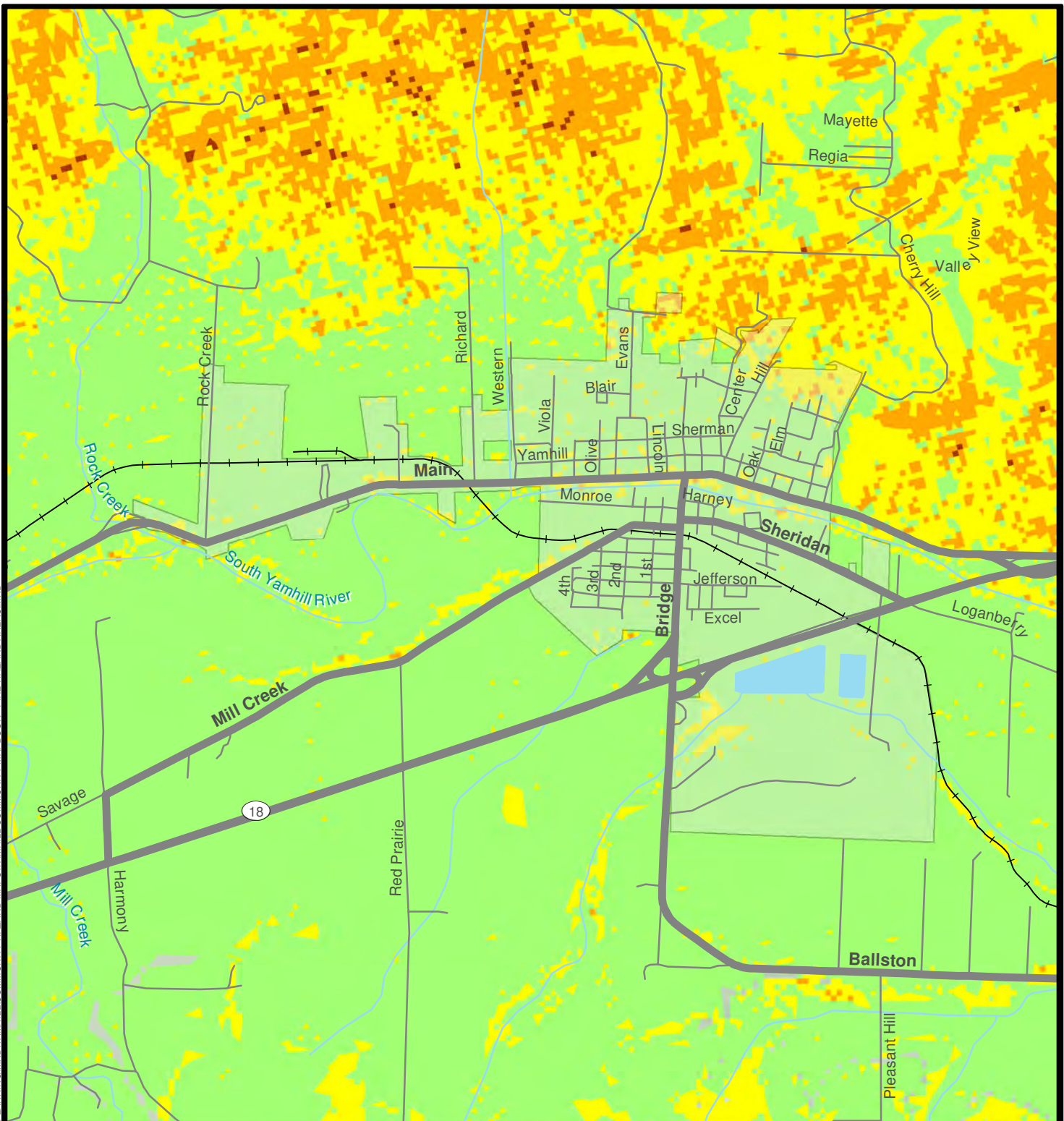
FIG. NO:
K-6G

LEGEND

Wildland Fire Risk

- Moderate
- High
- Very High
- Extreme
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

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OVERVIEW MAP



CITY OF SHERIDAN

WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

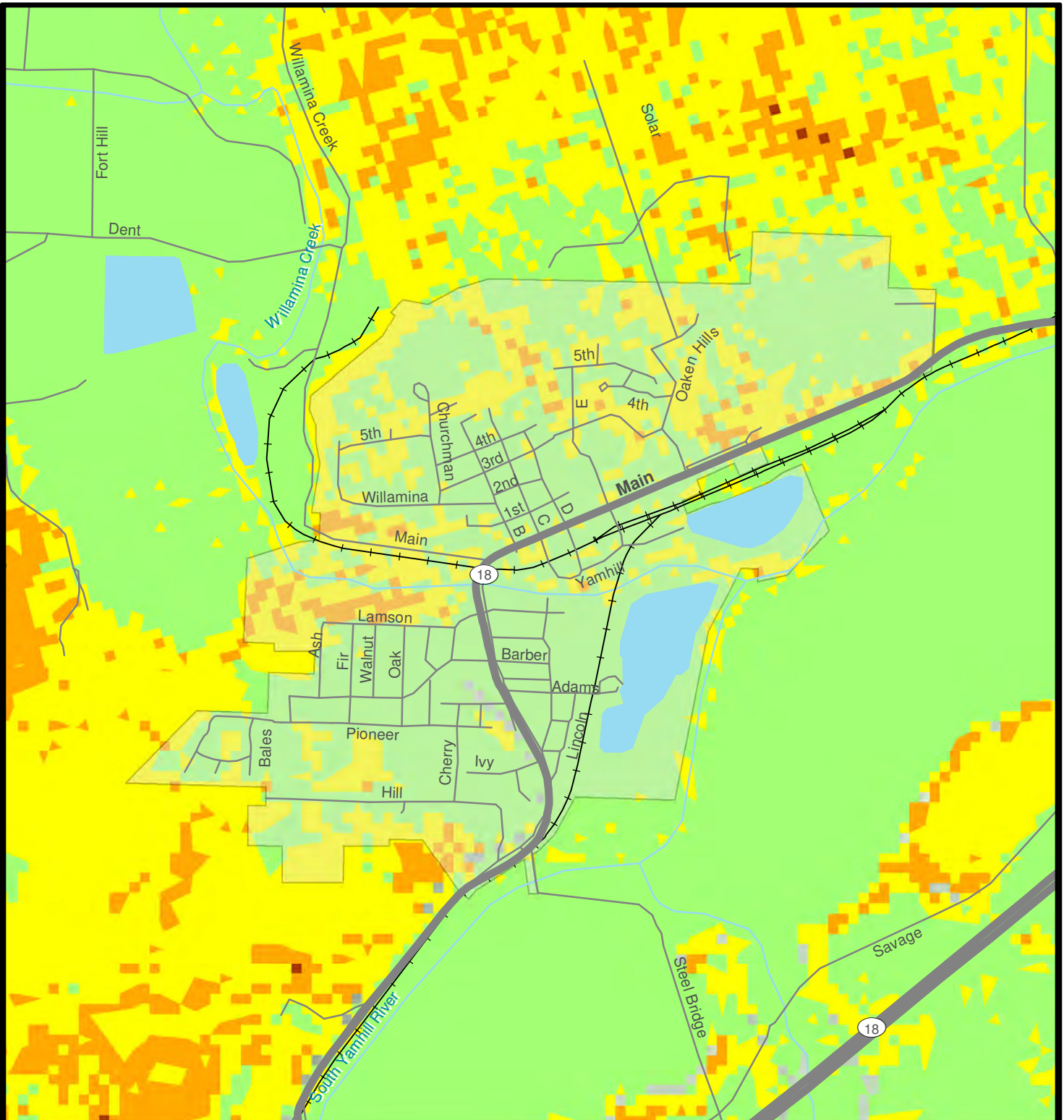


FIG. NO:
K-6H

LEGEND

Wildland Fire Risk

- Moderate
- High
- Very High
- Extreme
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways



OVERVIEW MAP



CITY OF WILLAMINA

WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

Wildland Fire Risk

- Moderate
- High
- Very High
- Extreme

City Limits

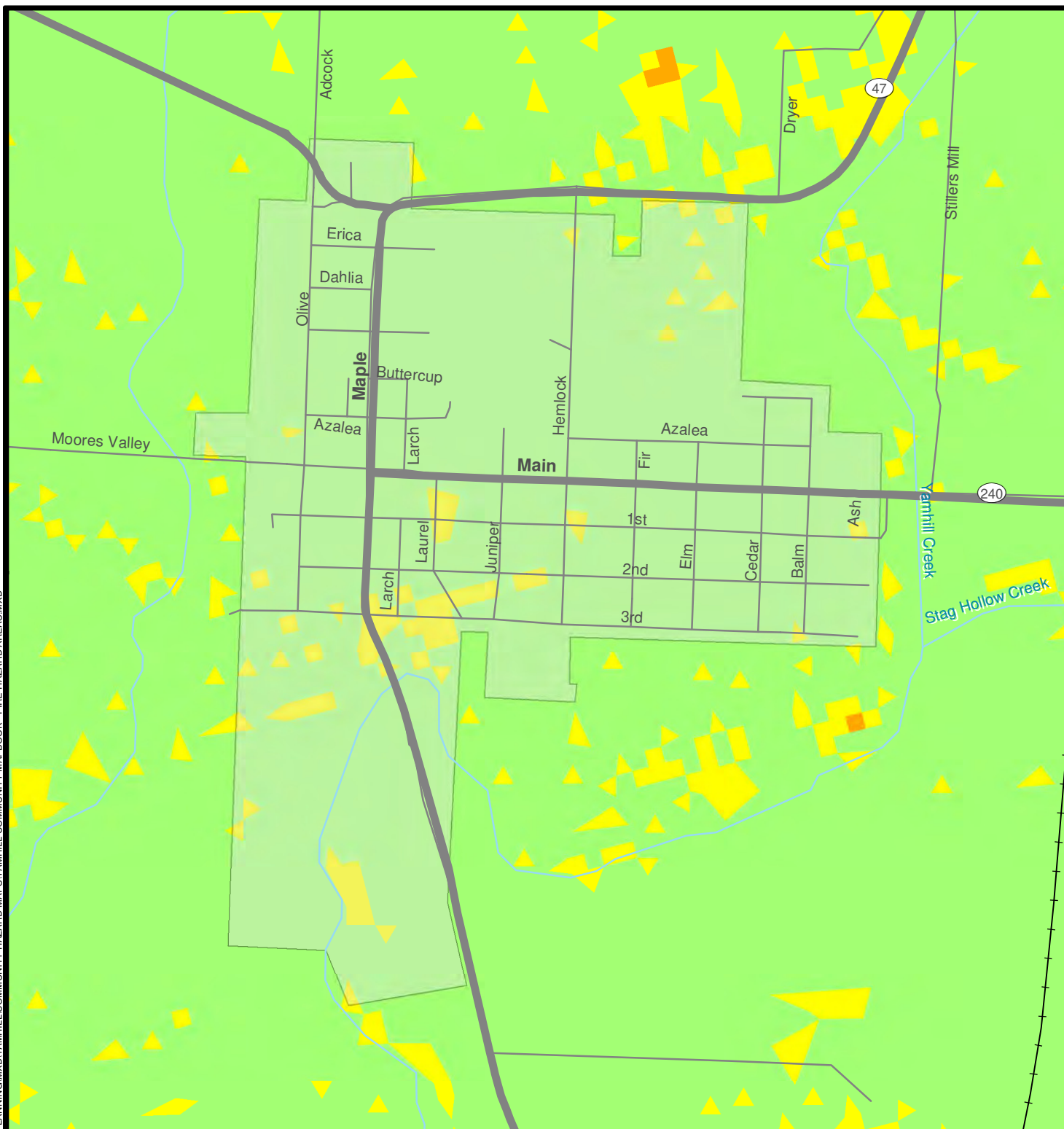
Streets & Highways

Railroads

Lakes & Waterbodies

Streams & Waterways

FIG. NO:
K-6I

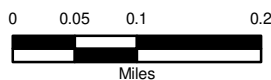


OVERVIEW MAP



YAMHILL CITY

WILDLAND FIRE HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

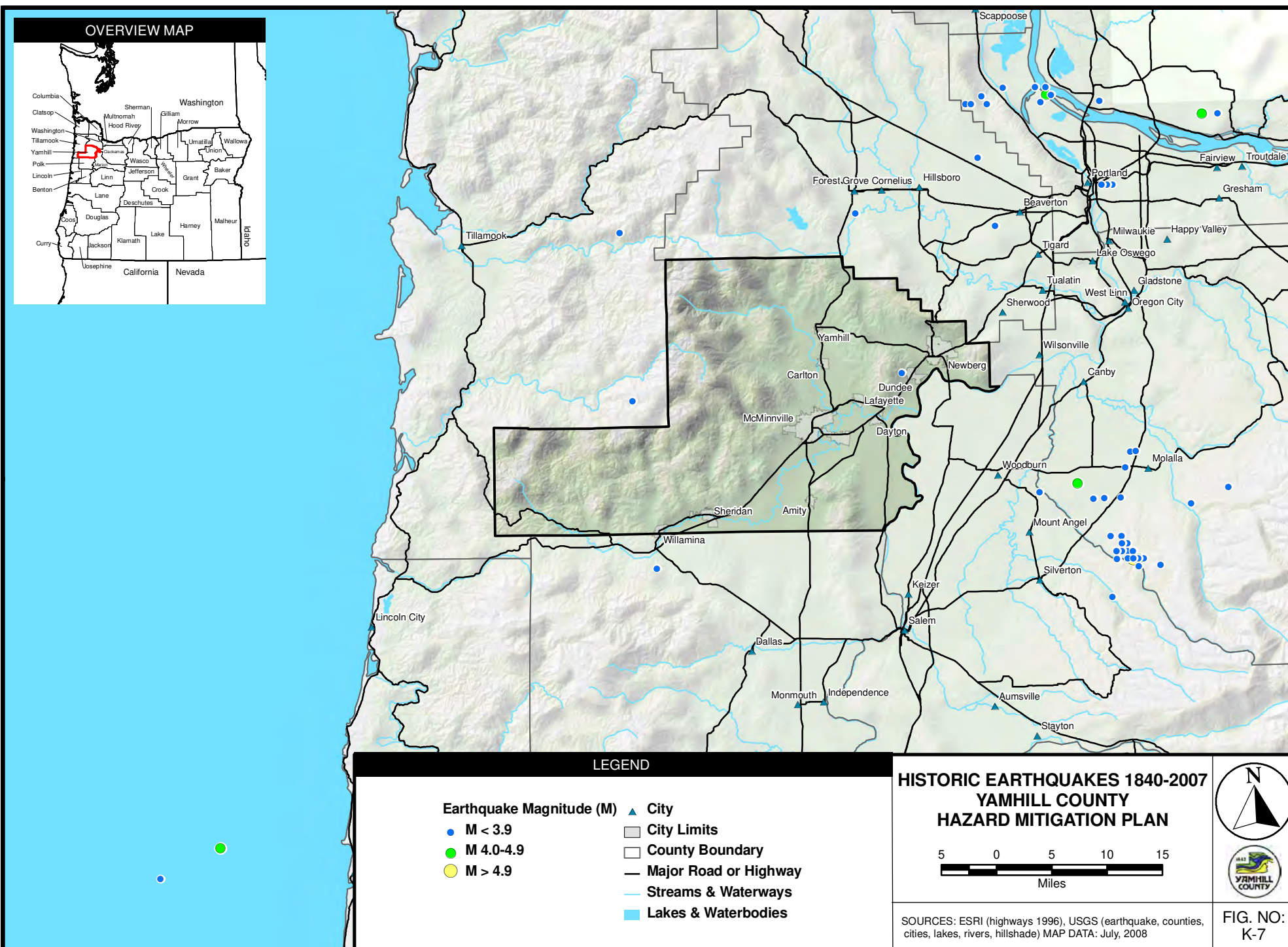


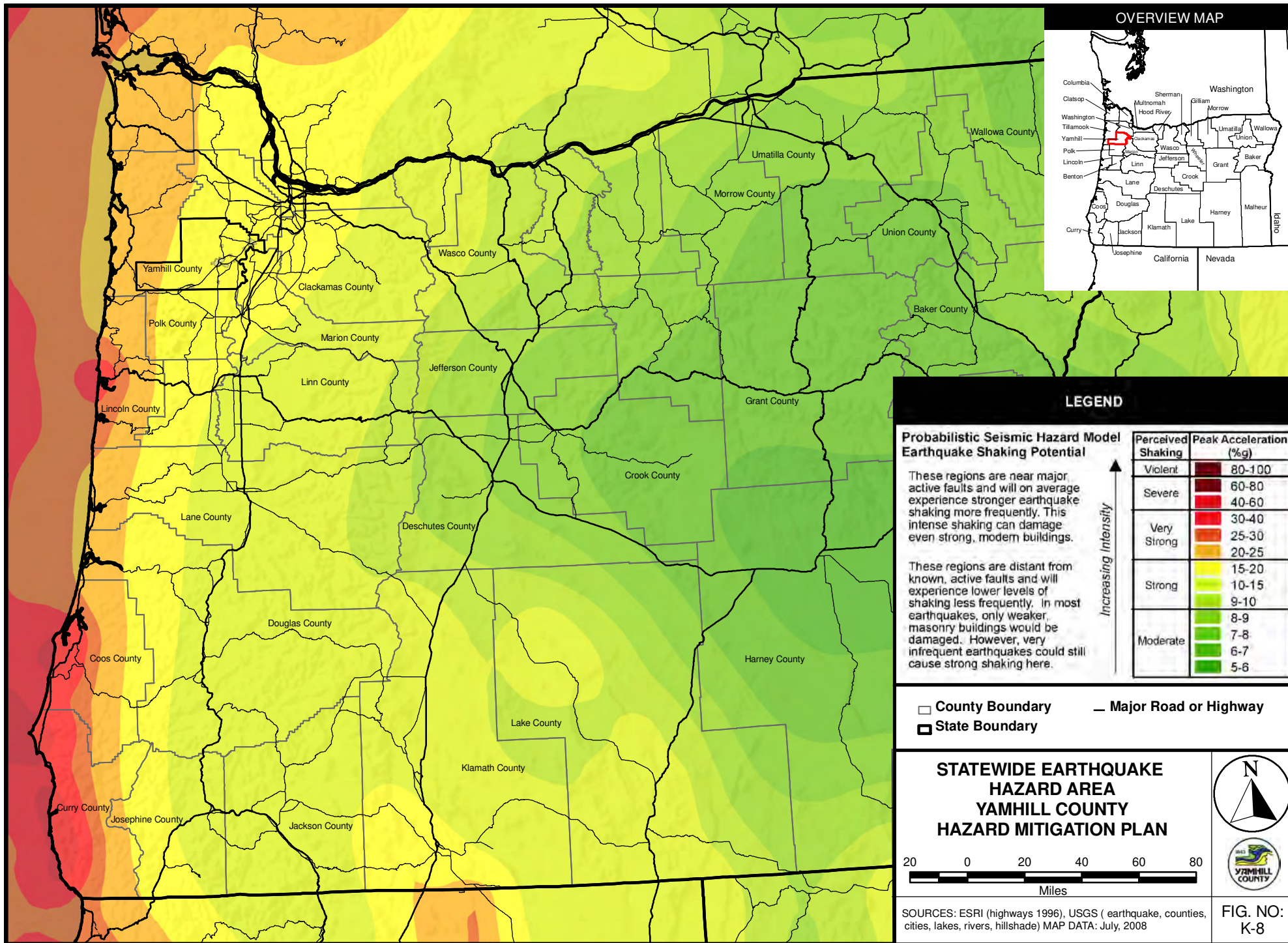
FIG. NO:
K-6J

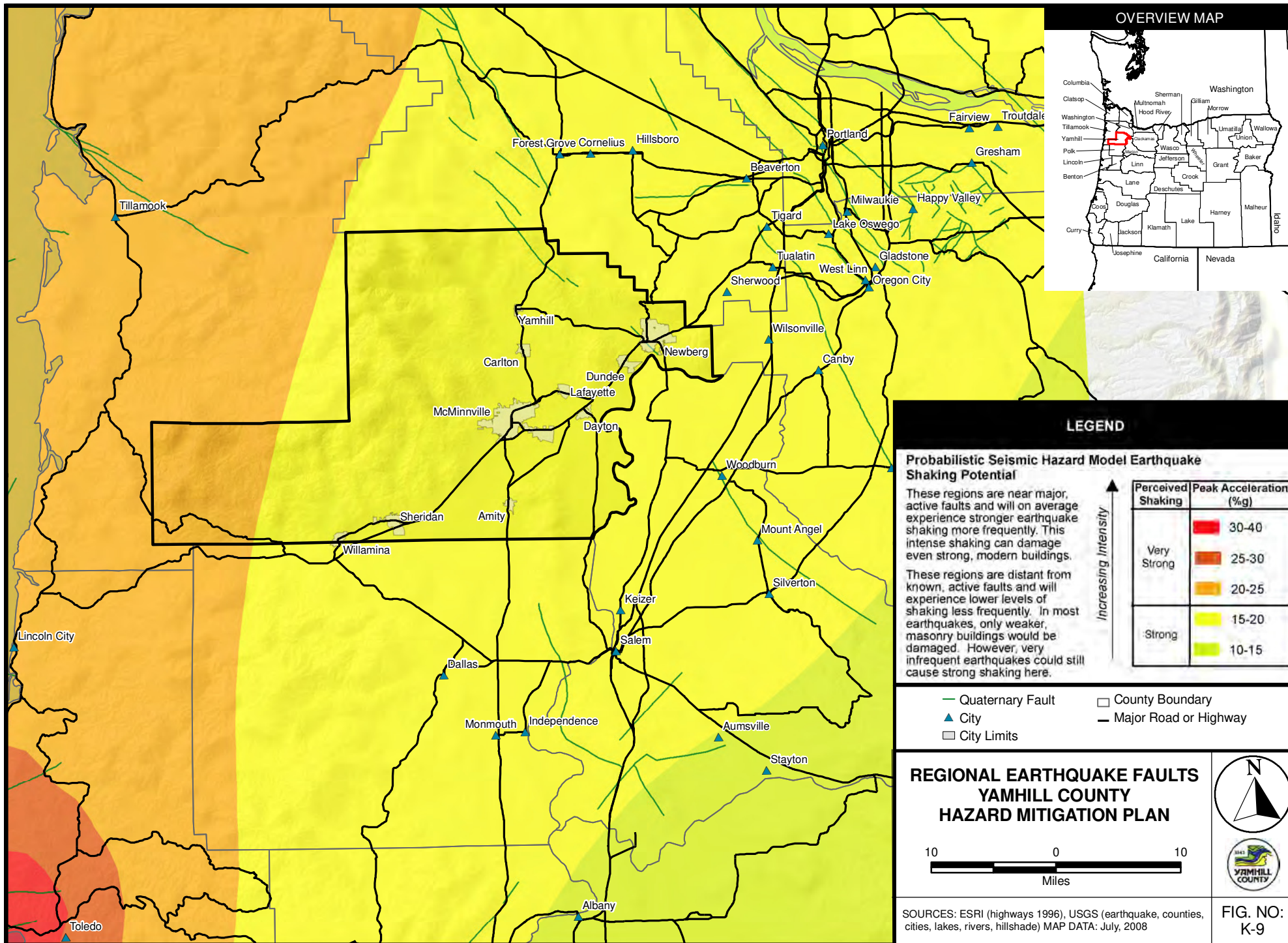
LEGEND

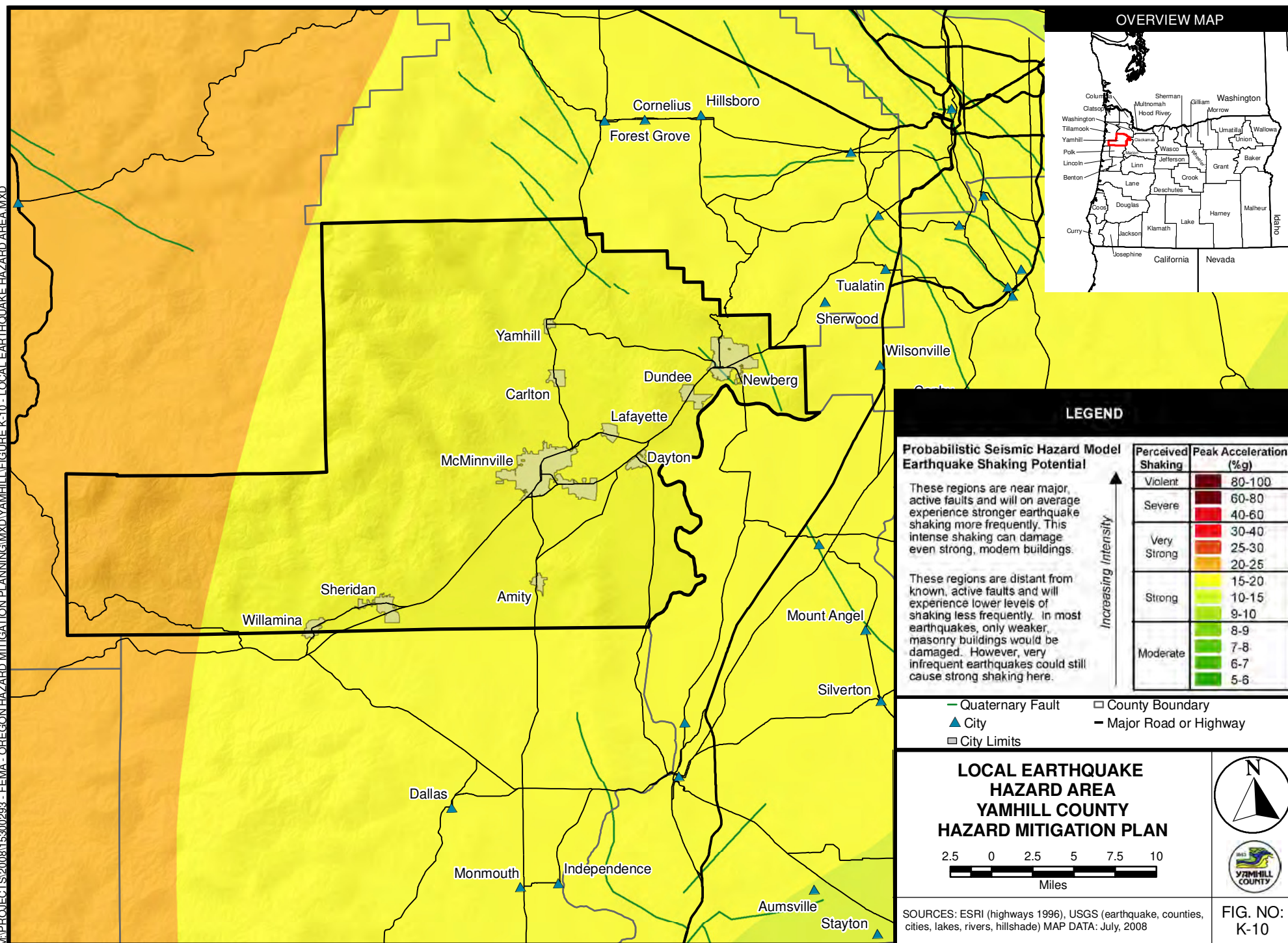
Wildland Fire Risk

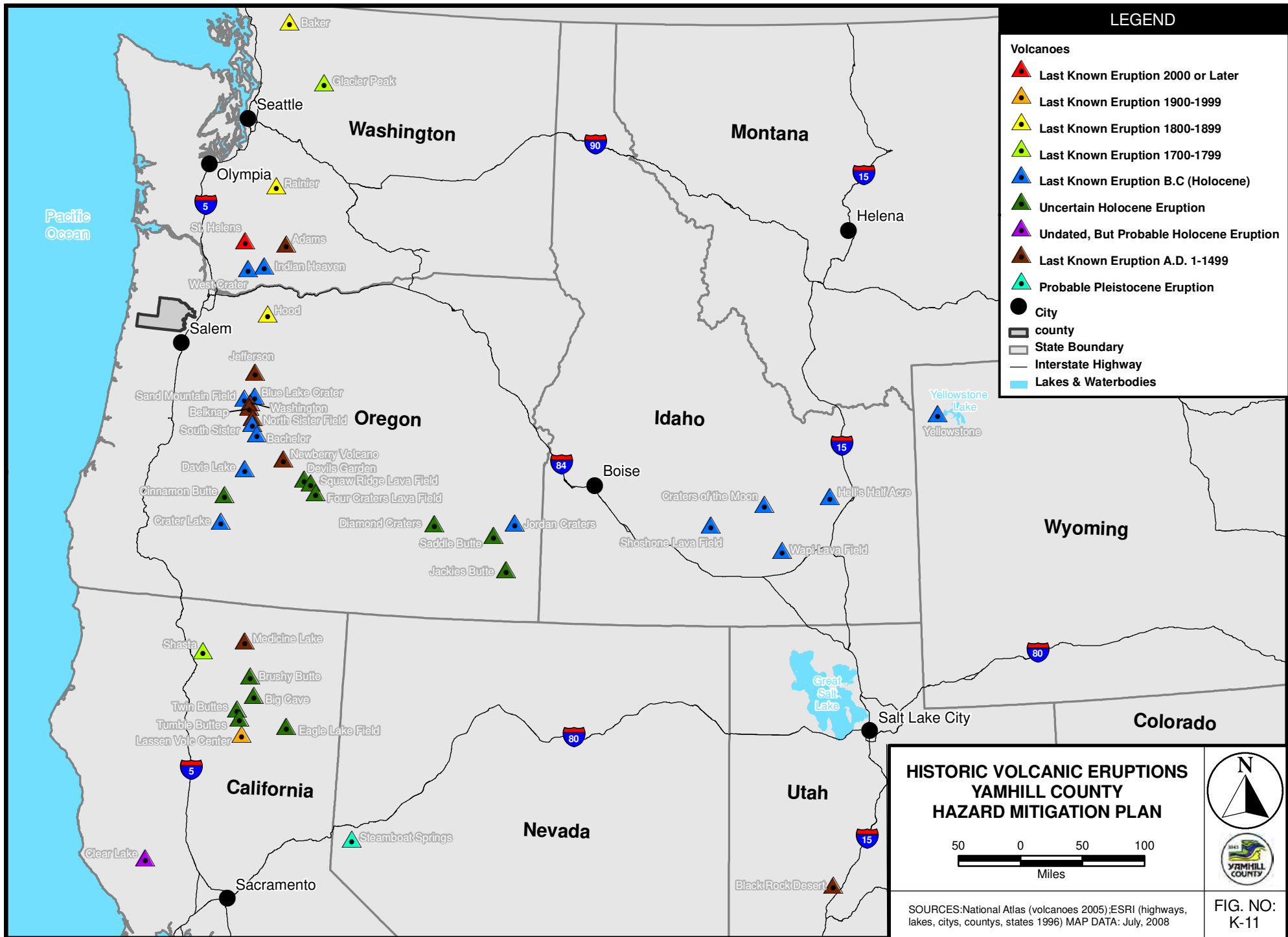
- Moderate
- High
- Very High
- Extreme
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

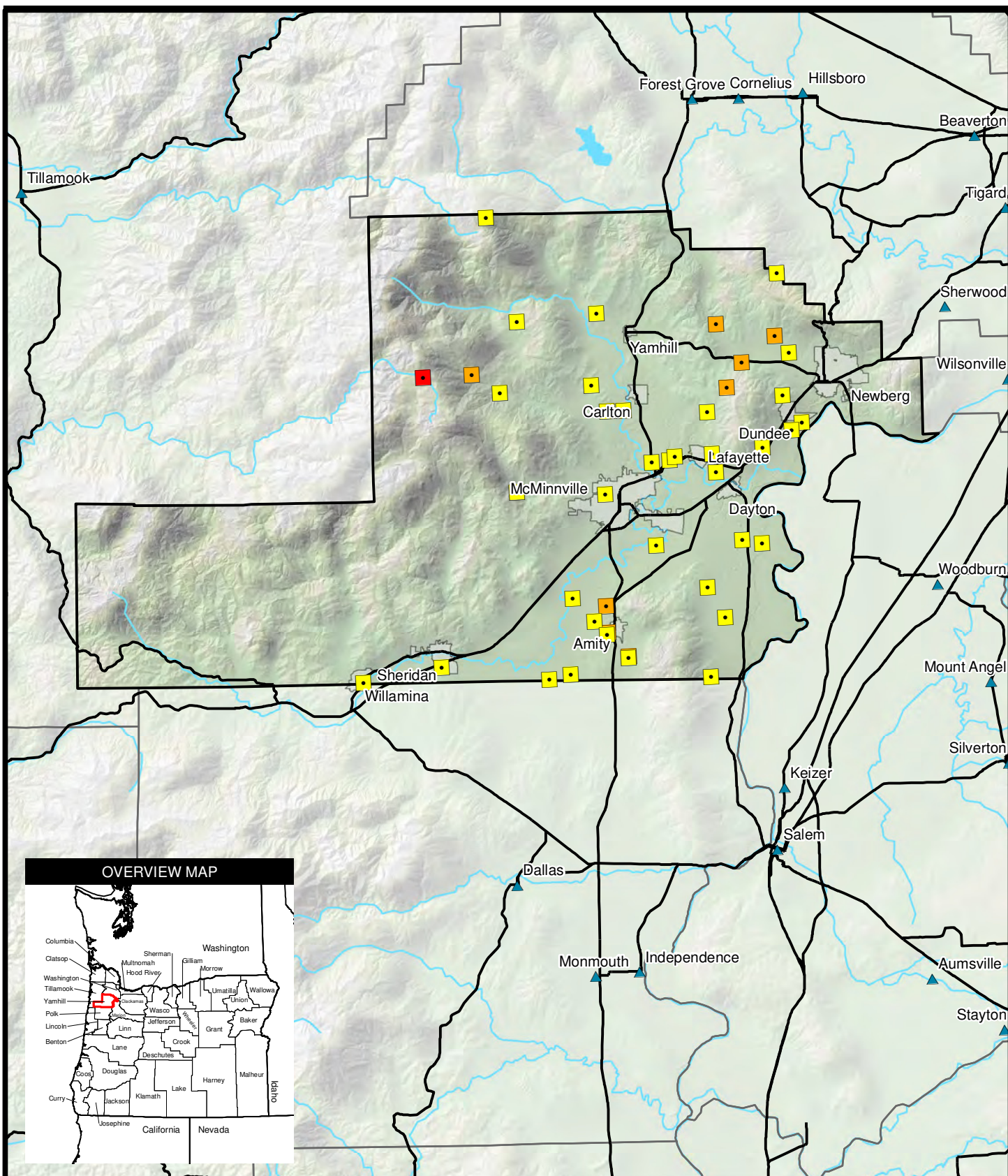








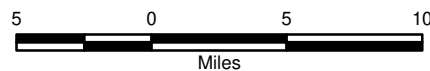




LEGEND

- | | |
|-------------------|-------------------------|
| Dam Hazard | ▲ City |
| ■ High | □ City Limits |
| ■ Low | □ County Boundary |
| ■ Significant | — Major Road or Highway |
| | — Streams & Waterways |
| | — Lakes & Waterbodies |

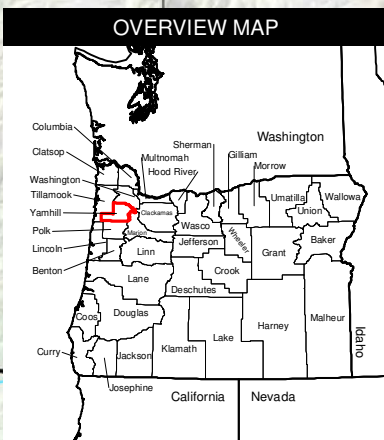
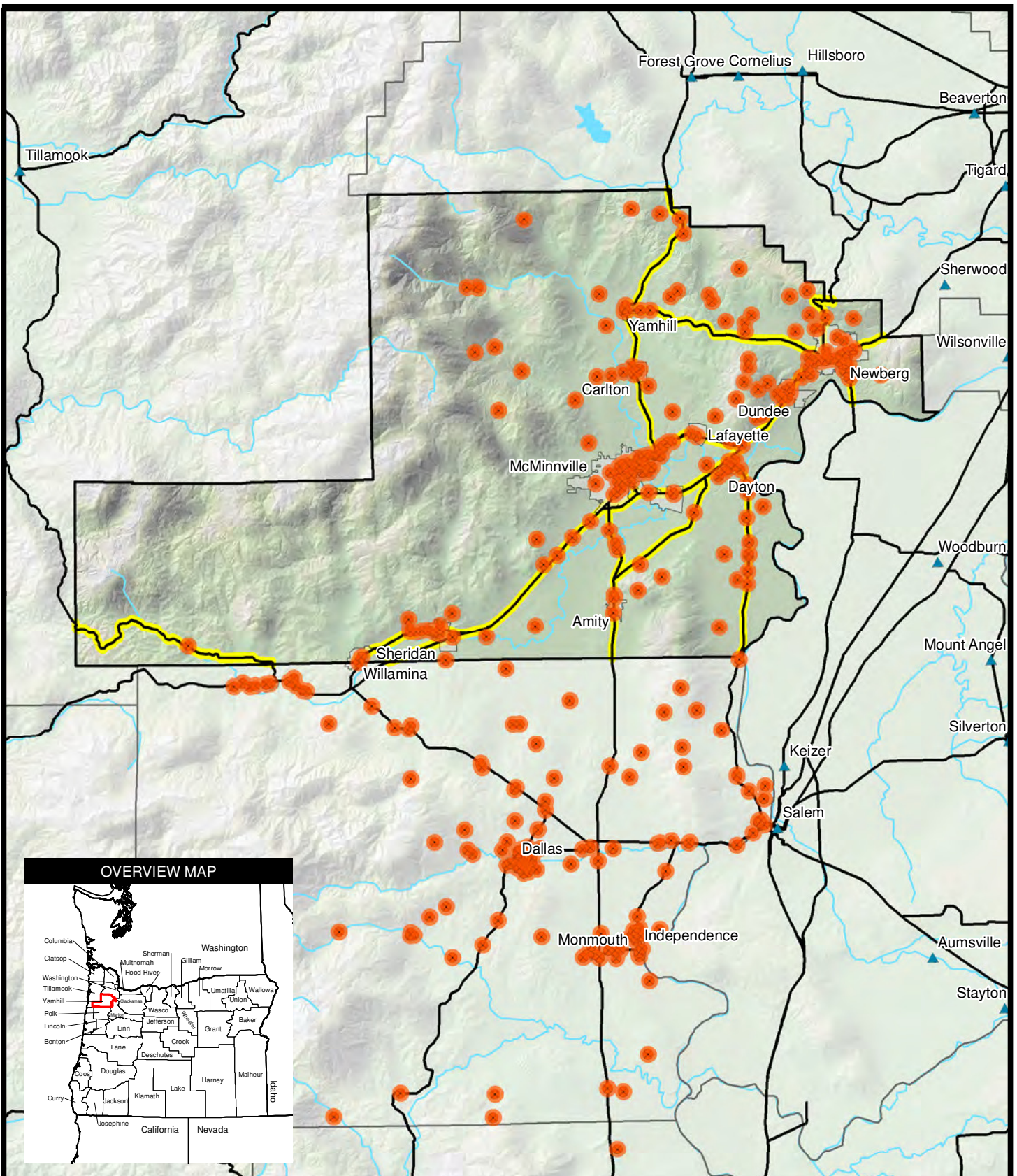
DAM LOCATIONS YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Dam Hazards (OWRD, 2007), ESRI (highways 1996), USGS (counties, cities, lakes, rivers, hillshade)
MAP DATA: July, 2008



FIG. NO:
K-12



LEGEND

Hazardous Materials Transport

- Quarter Mile Corridor
- EHS Site 1/4-Mile Buffer
- EHS Site

- City
- City Limits
- County Boundary
- Major Road or Highway
- Streams & Waterways
- Lakes & Waterbodies

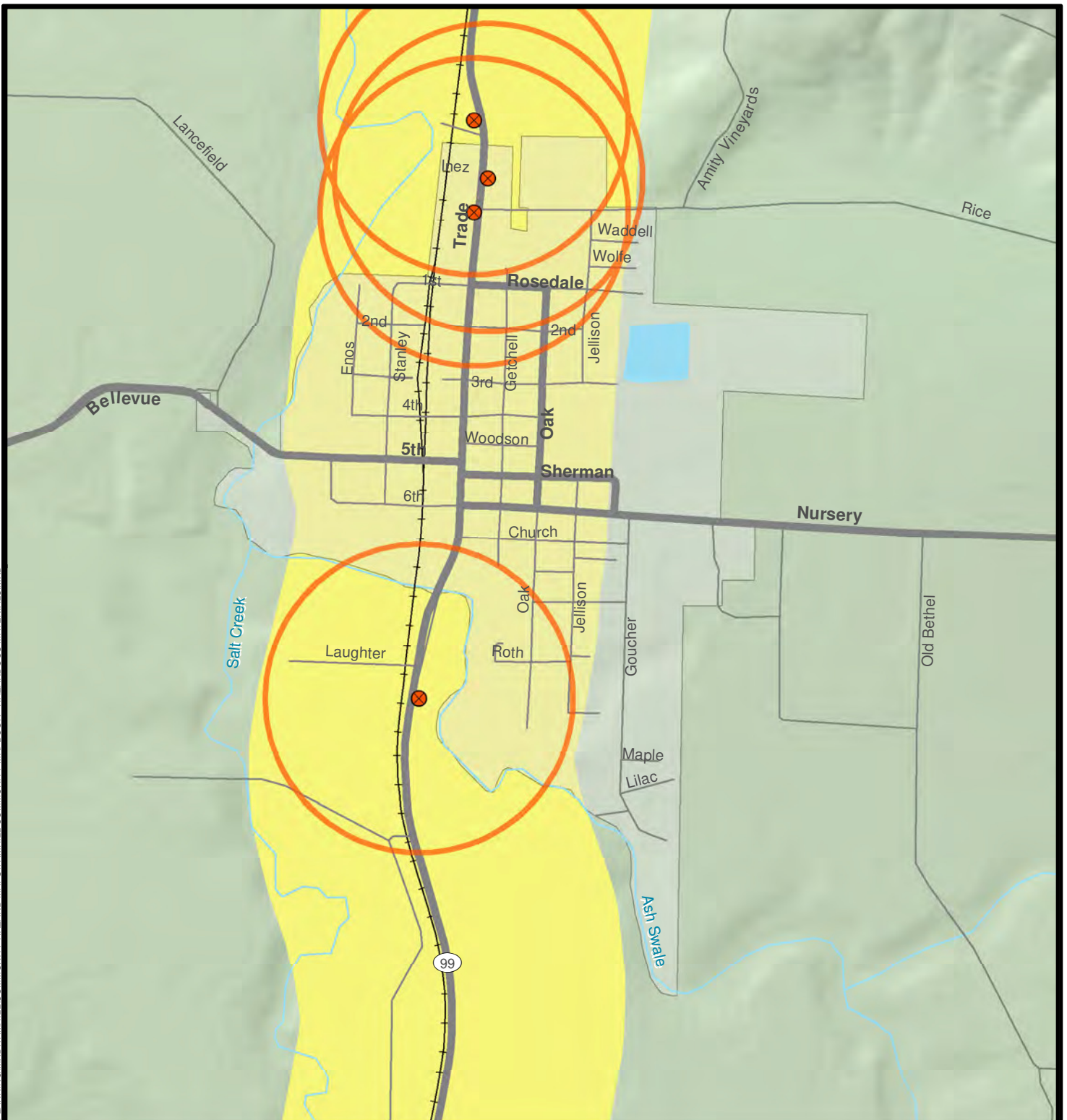
HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: ESRI (highways 1996), USGS (counties, cities, lakes, rivers, hillshade) MAP DATA: July, 2008



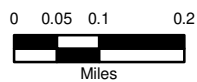
FIG. NO:
K-13



OVERVIEW MAP



CITY OF AMITY HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



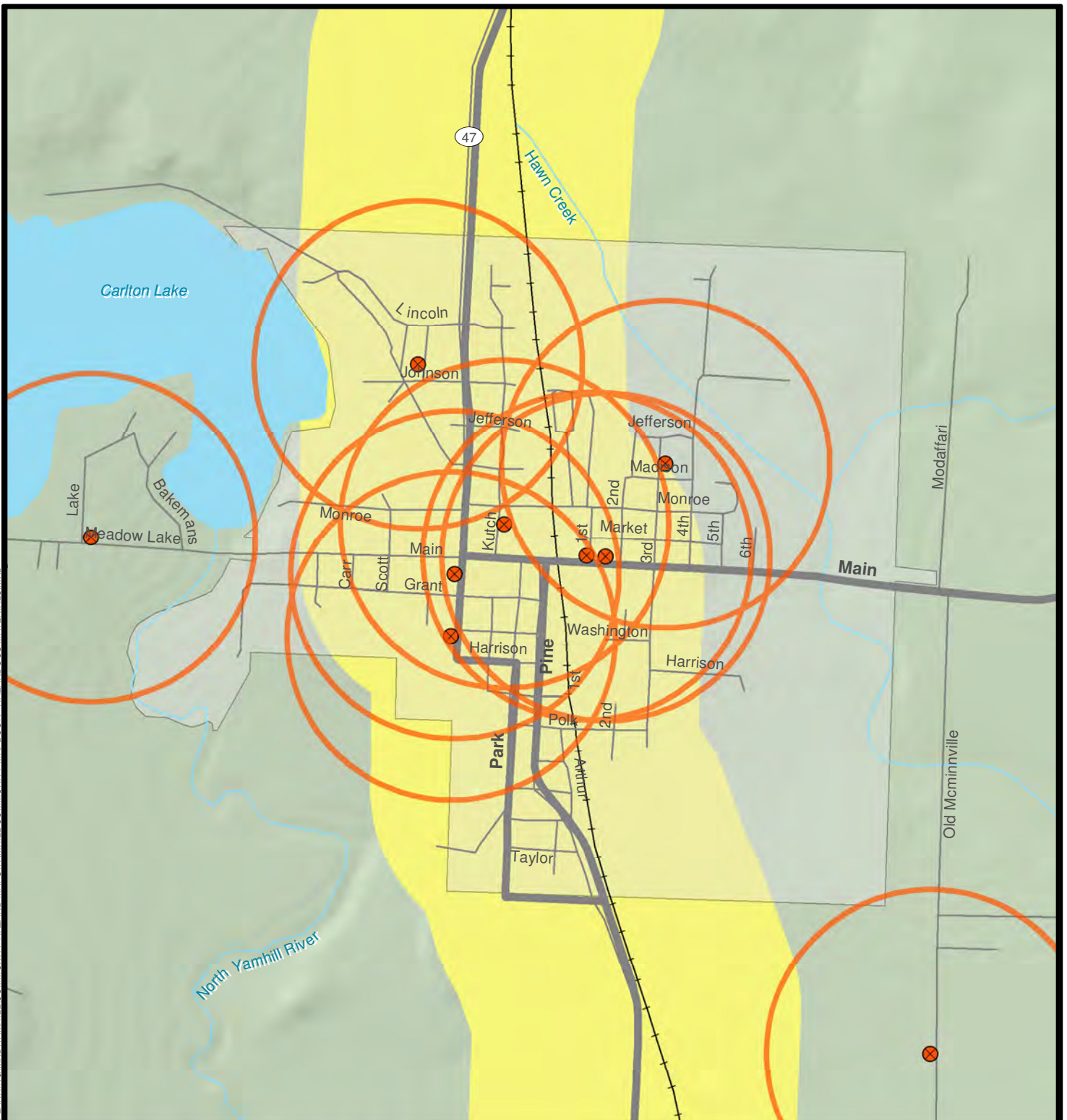
SOURCES: EHS Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHS Site 1/4-Mile Buffer
- EHS Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

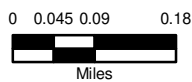
FIG. NO:
K-13B



OVERVIEW MAP



CITY OF CARLTON HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



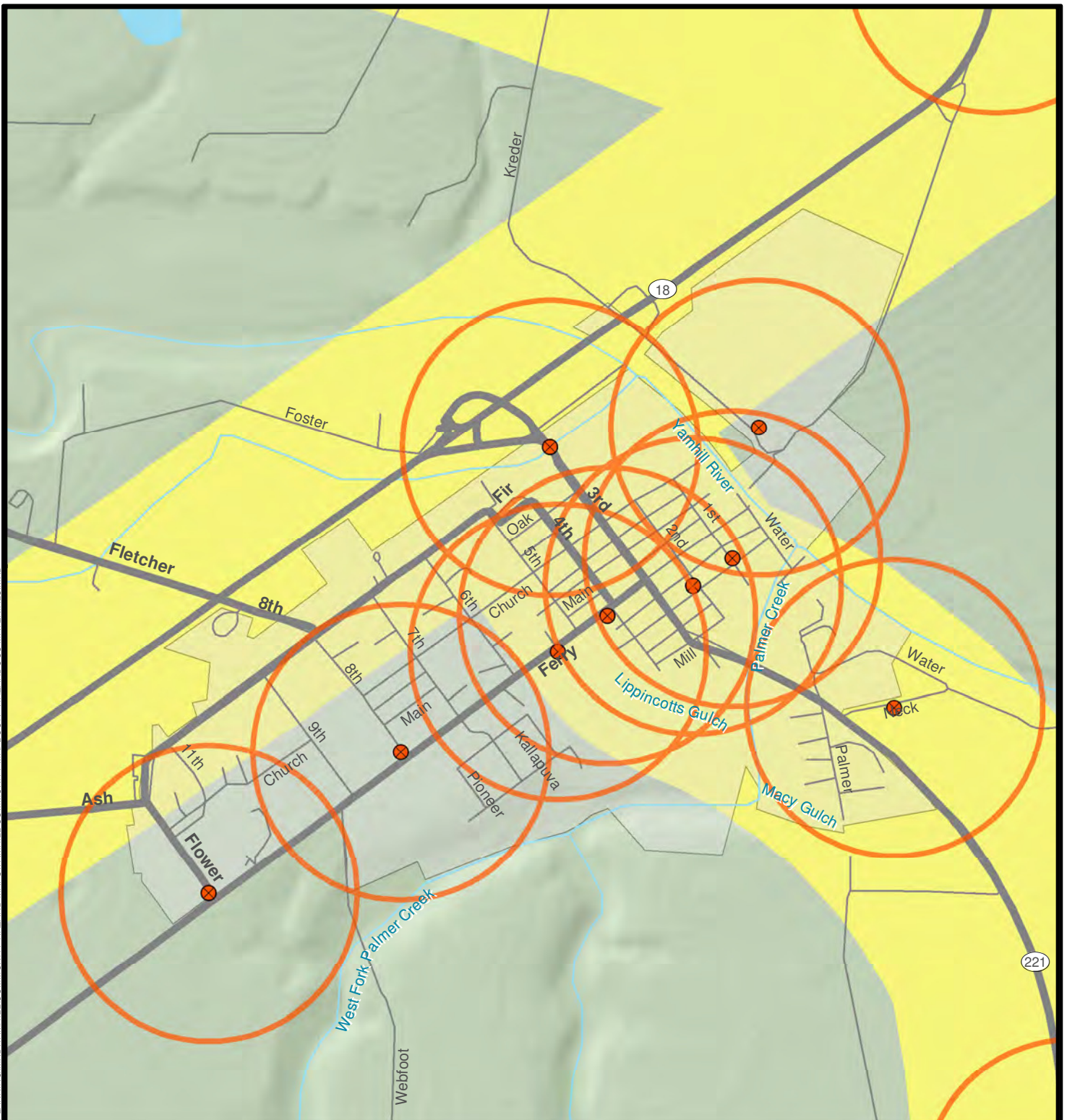
SOURCES: EHS Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHS Site 1/4-Mile Buffer
- EHS Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

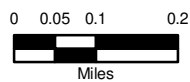
FIG. NO:
K-13C



OVERVIEW MAP



CITY OF DAYTON HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



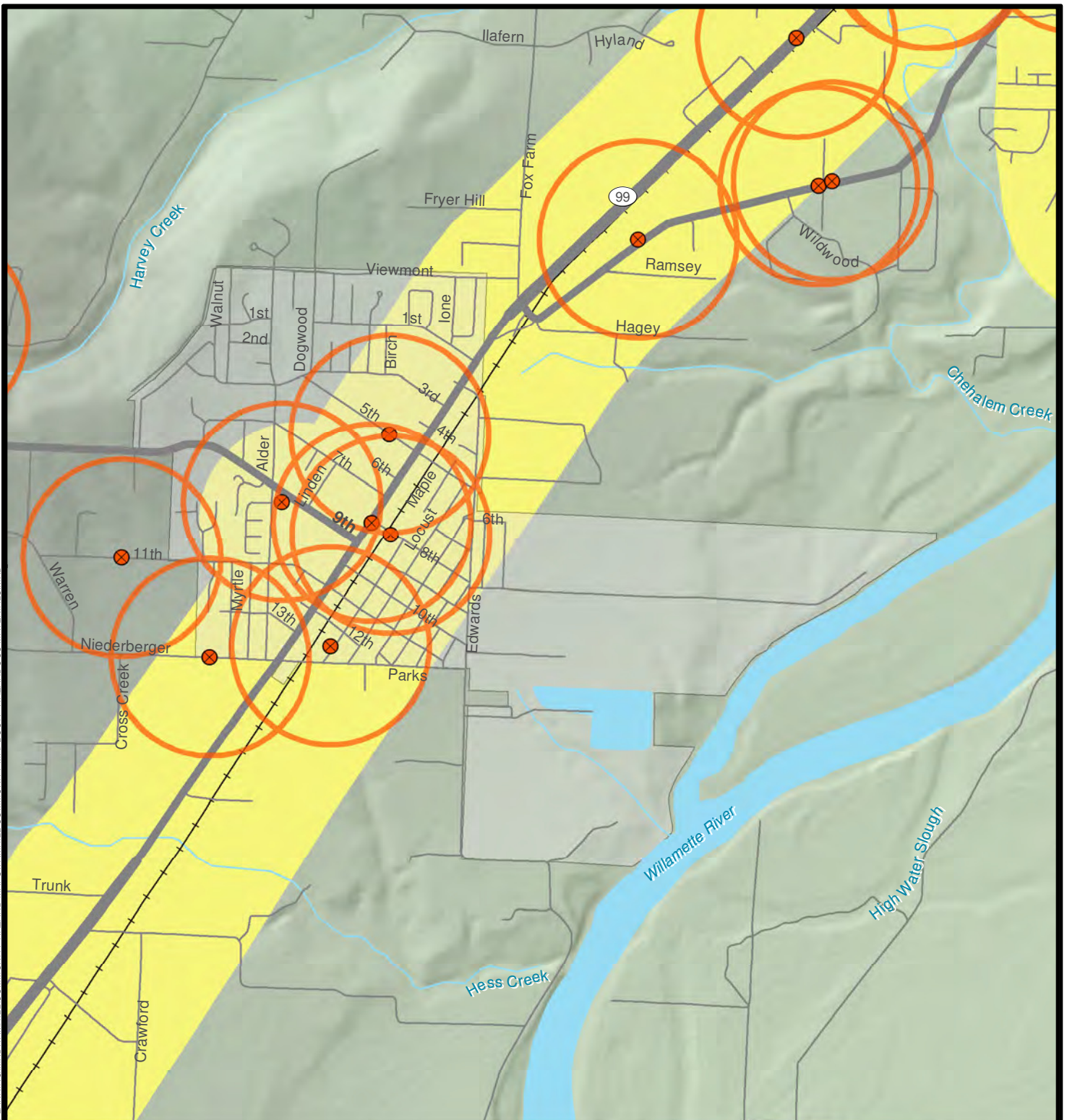
SOURCES: EHS Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHs Site 1/4-Mile Buffer
- EHs Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

FIG. NO:
K-13D



OVERVIEW MAP



CITY OF DUNDEE HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: EHS Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

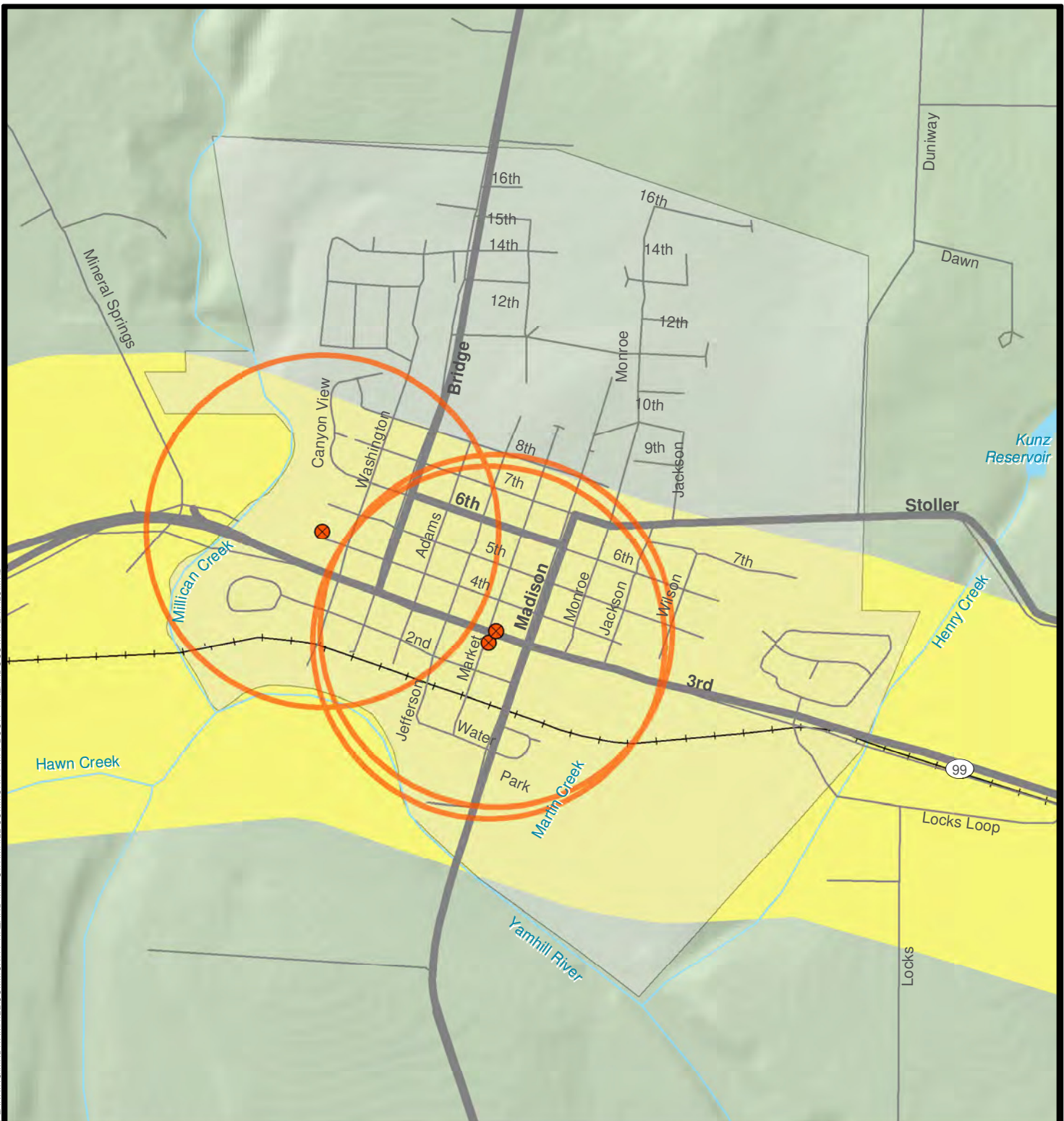


LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHS Site 1/4-Mile Buffer
- EHS Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

FIG. NO:
K-13E

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OVERVIEW MAP



CITY OF LAFAYETTE HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



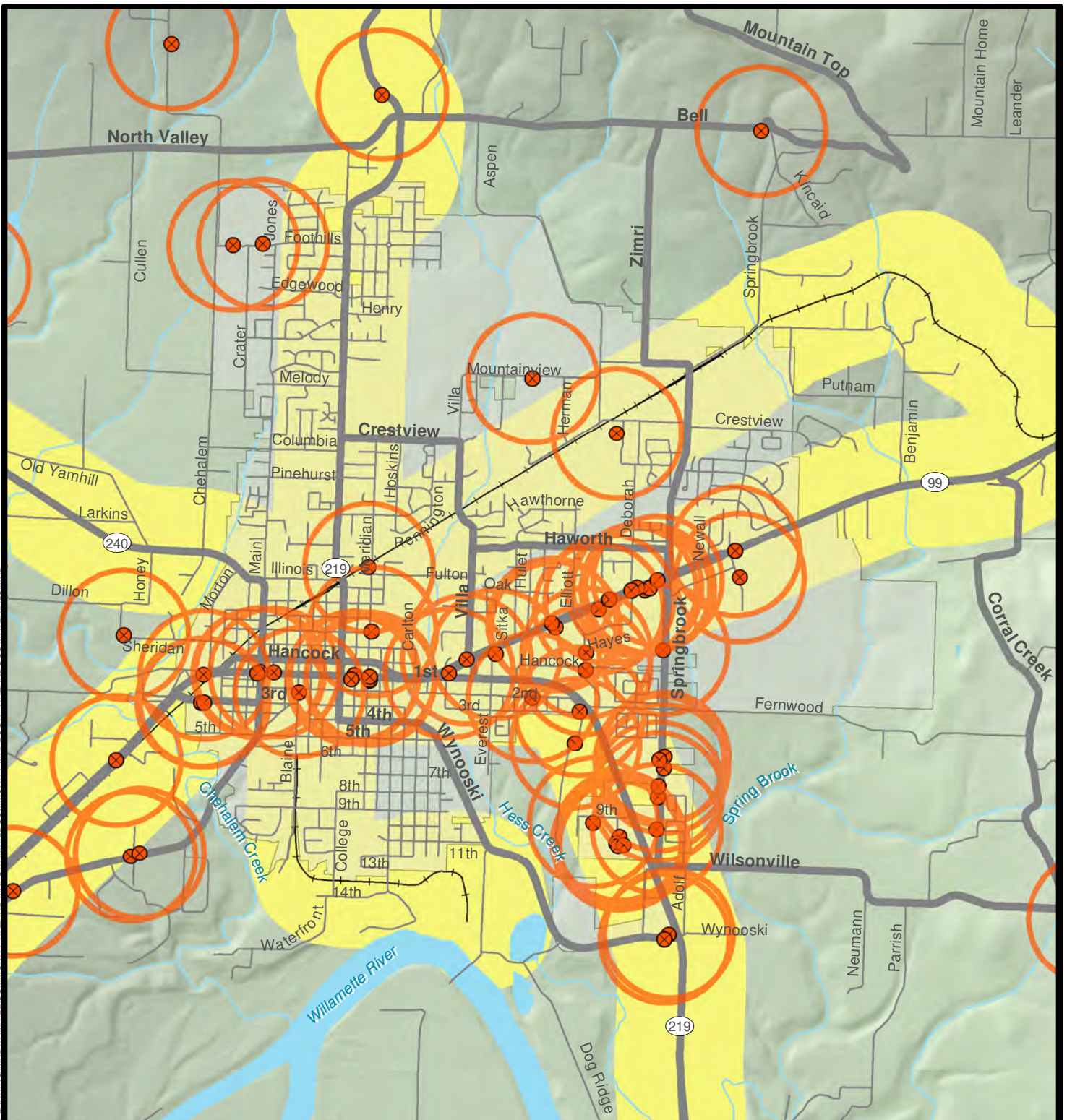
SOURCES: EHS Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHS Site 1/4-Mile Buffer
- EHS Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

FIG. NO:
K-13F



OVERVIEW MAP



CITY OF NEWBERG HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



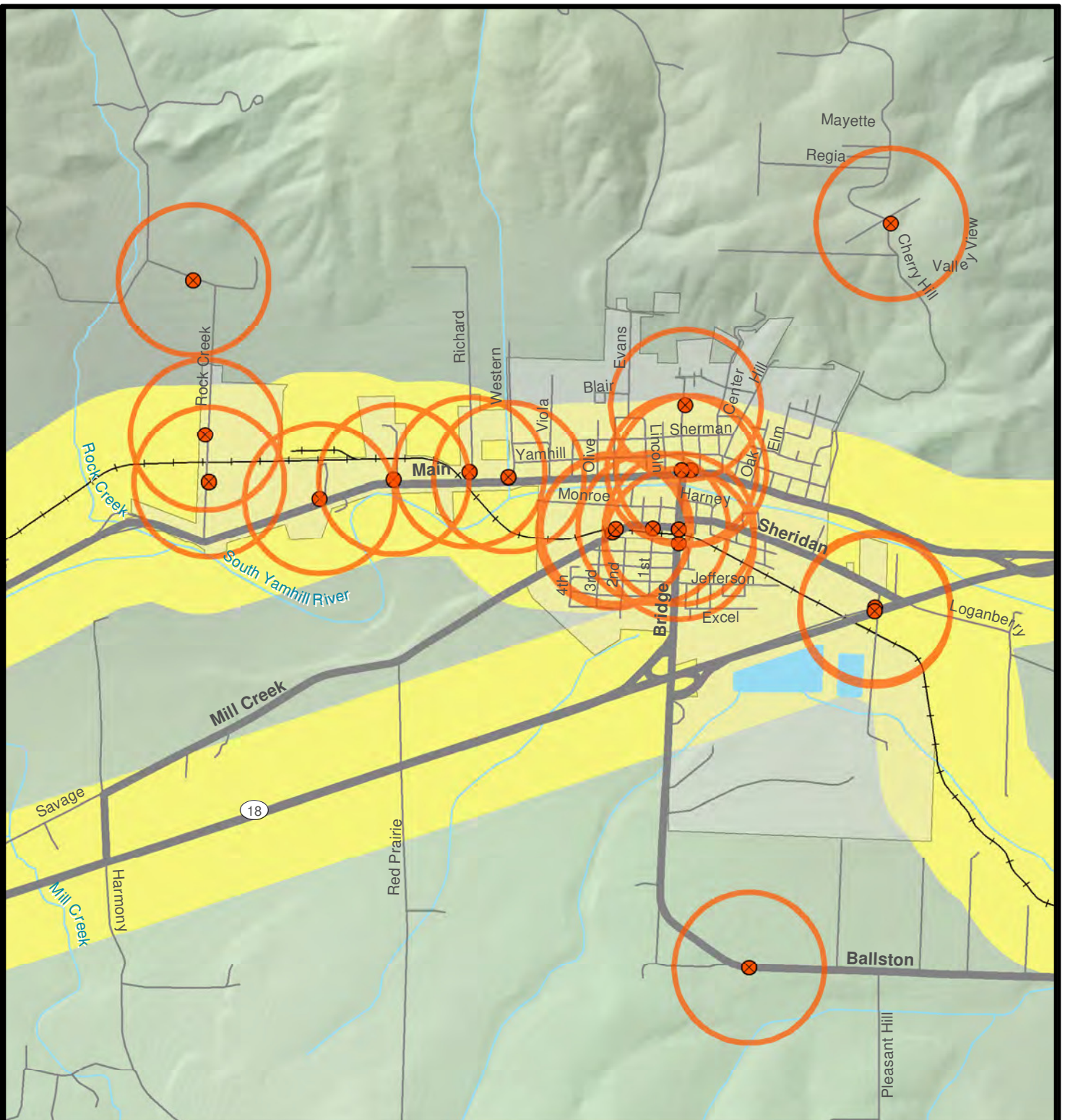
SOURCES: EHs Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHs Site 1/4-Mile Buffer
- EHs Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

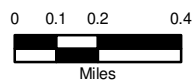
FIG. NO:
K-13G



OVERVIEW MAP



CITY OF SHERIDAN HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



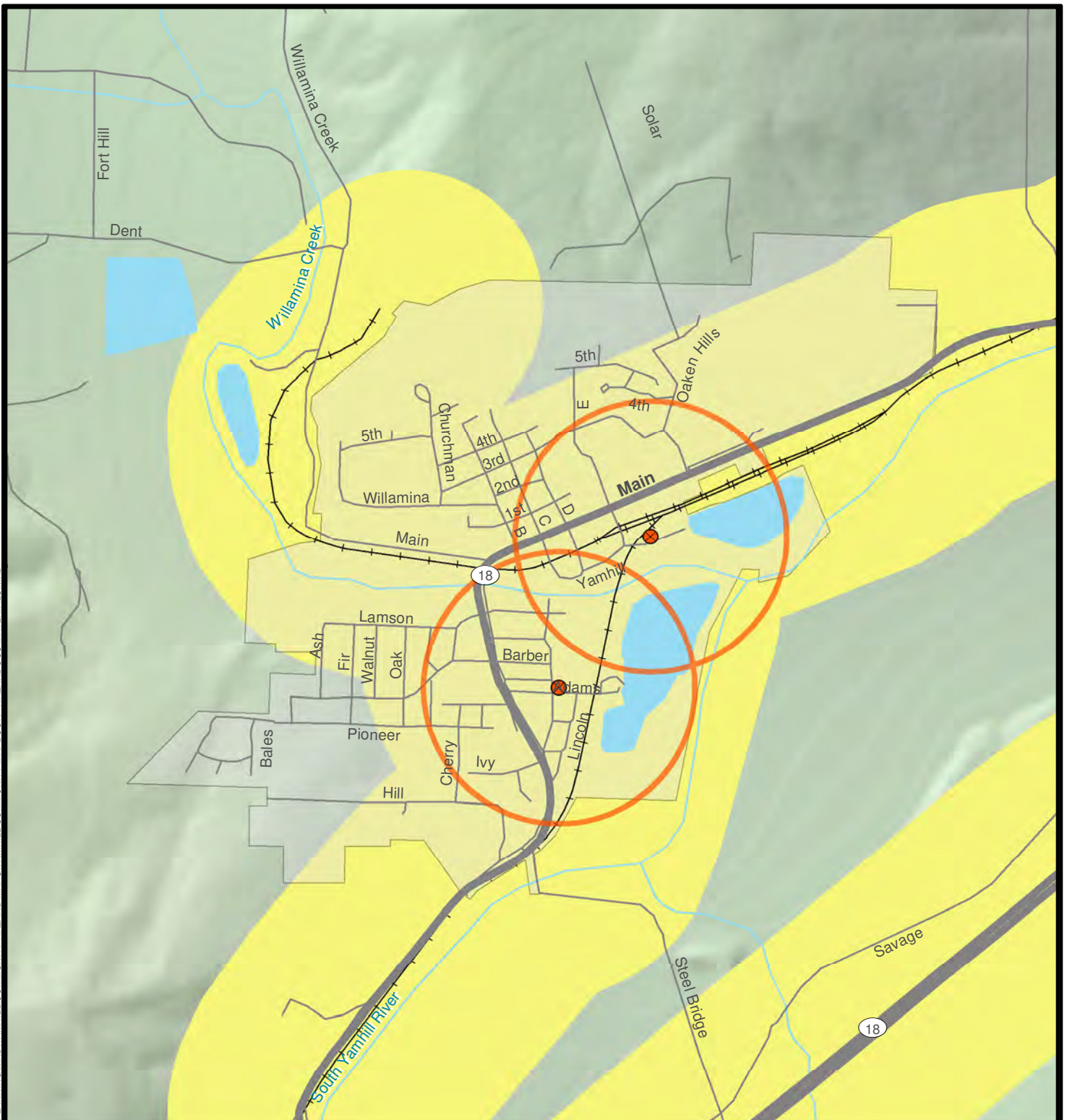
SOURCES: EHS Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHS Site 1/4-Mile Buffer
- EHS Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

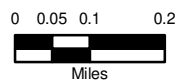
FIG. NO:
K-13H



OVERVIEW MAP



CITY OF WILLAMINA HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



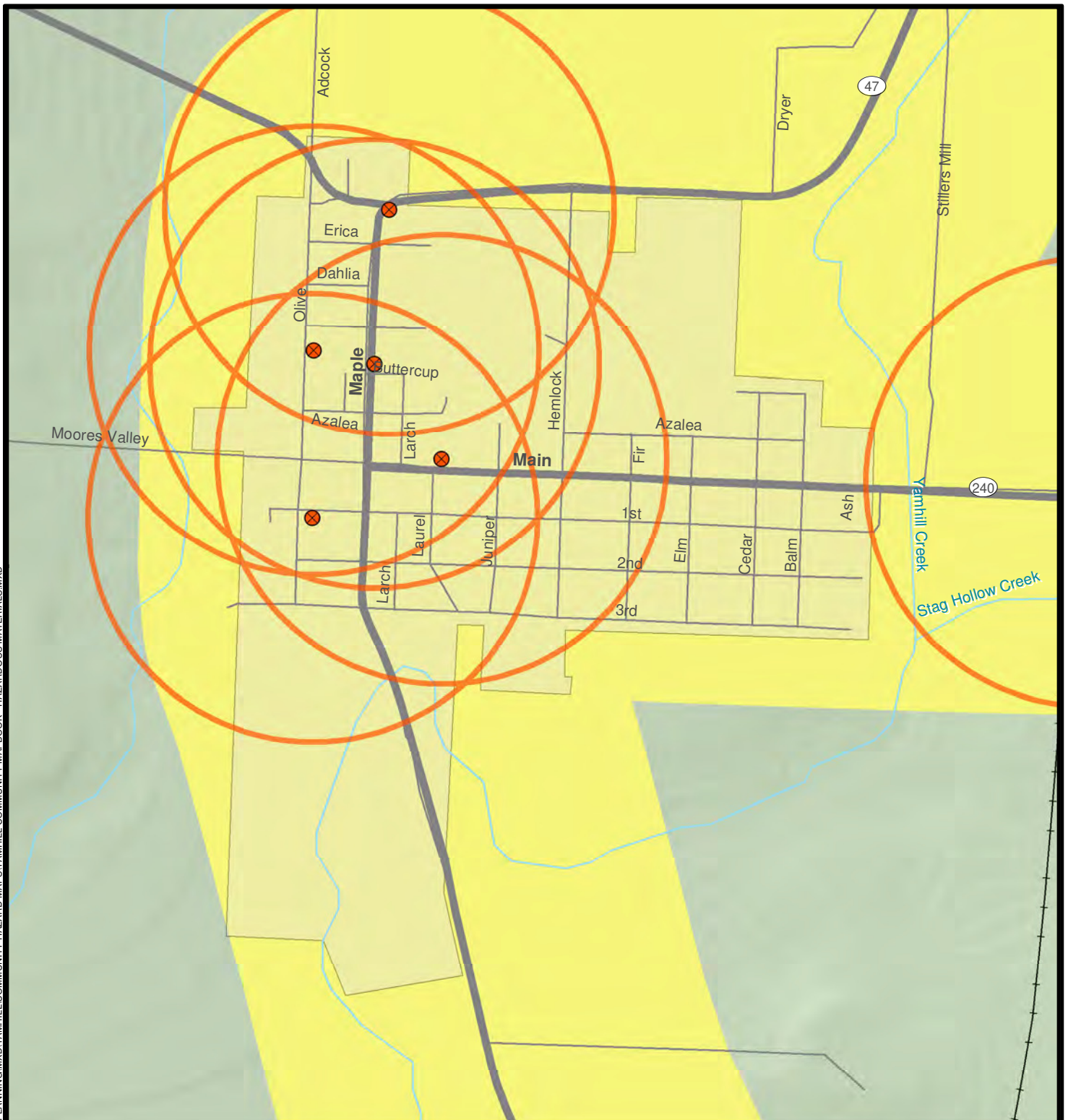
SOURCES: EHS Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHS Site 1/4-Mile Buffer
- EHS Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

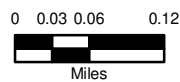
FIG. NO:
K-13I



OVERVIEW MAP



YAMHILL CITY HAZARDOUS MATERIALS YAMHILL COUNTY HAZARD MITIGATION PLAN



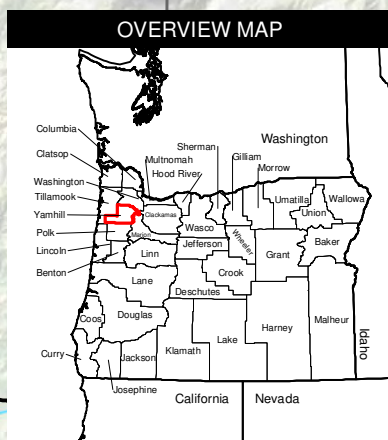
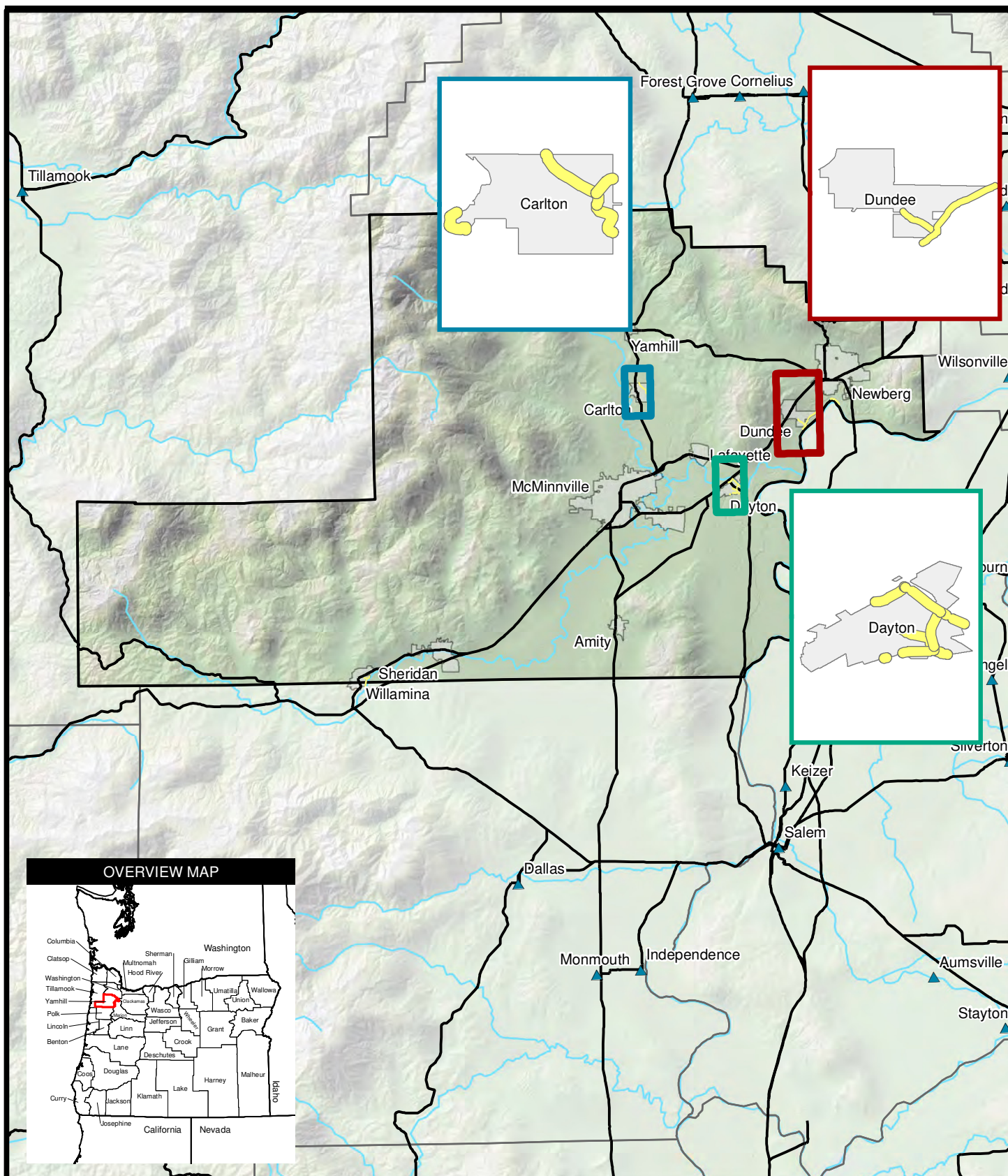
SOURCES: EHS Sites (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



LEGEND

- 1/4-Mile Corridor Along Active Freight Rail and Highways
- EHS Site 1/4-Mile Buffer
- EHS Site
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

FIG. NO:
K-13J



LEGEND

- Potential Erosion Hazard
- City Limits
- County Boundary
- Major Road or Highway
- Streams & Waterways
- Lakes & Waterbodies
- City

EROSION HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN

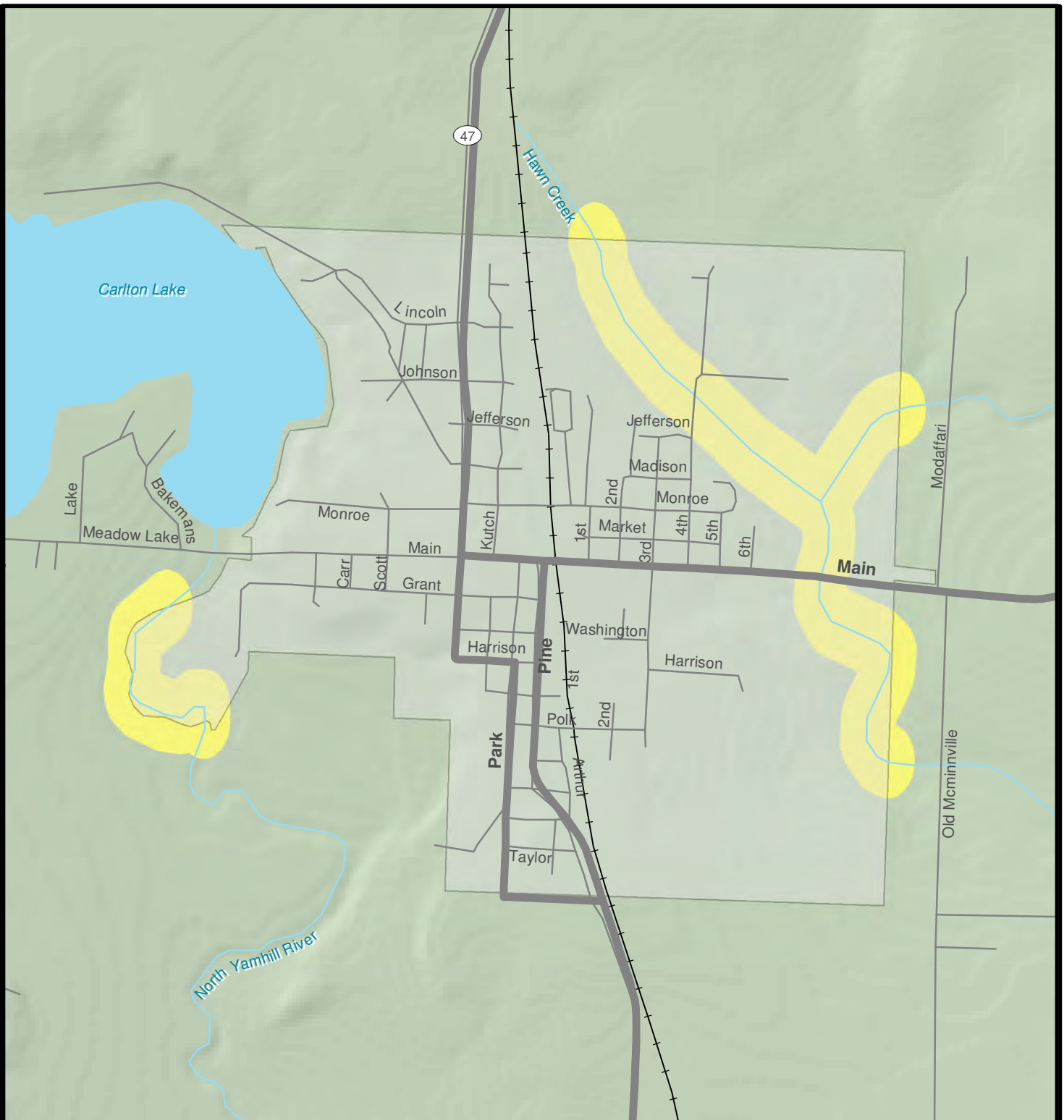


SOURCES: ESRI (highways 1996), USGS (counties, cities, lakes, rivers, hillshade) MAP DATA: July, 2008



FIG. NO:
K-14

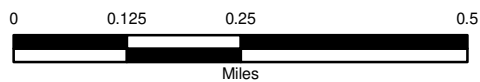
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OVERVIEW MAP



CITY OF CARLTON
EROSION HAZARD AREA
YAMHILL COUNTY
HAZARD MITIGATION PLAN



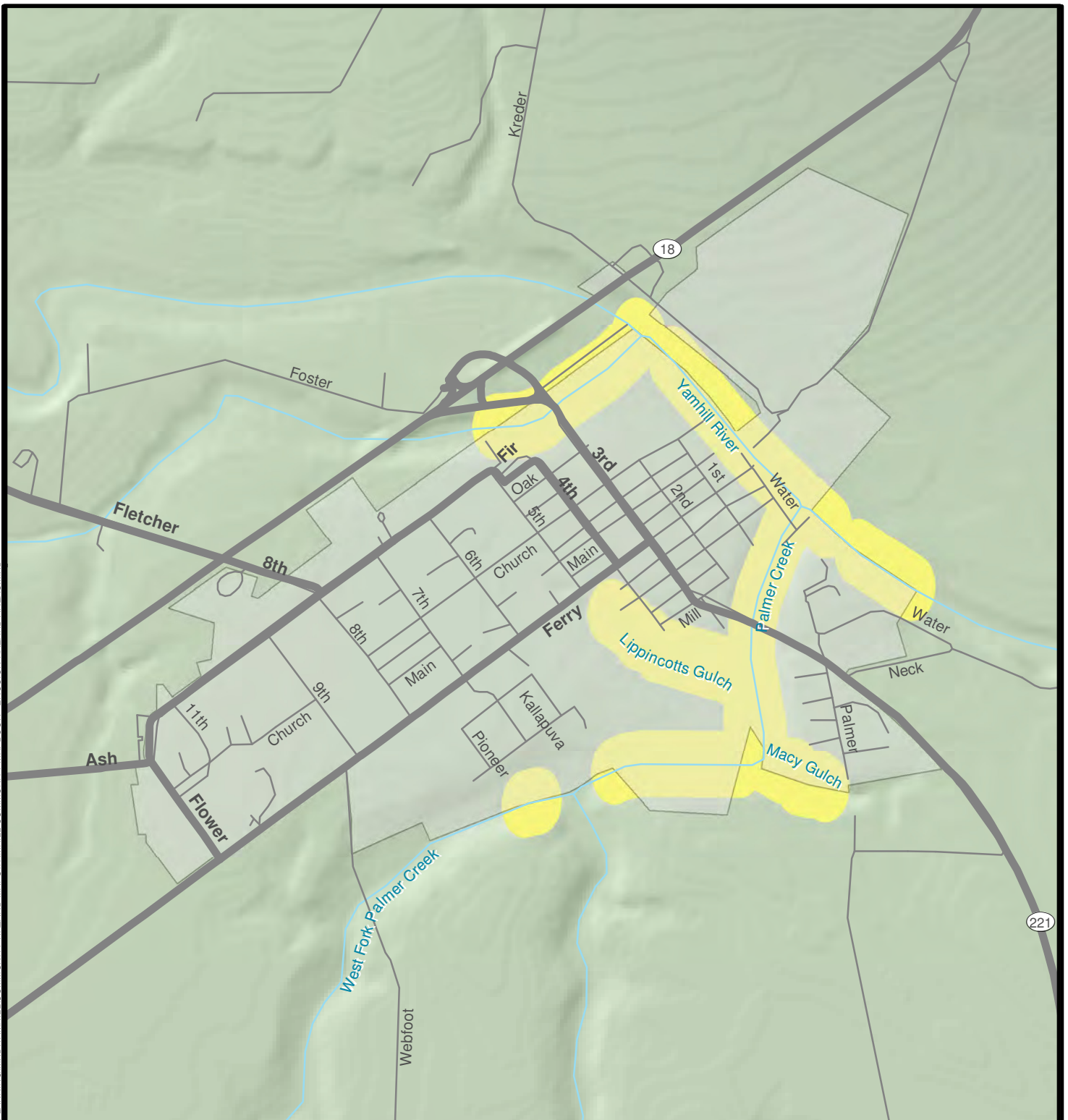
SOURCES: Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

FIG. NO:
K-14B

LEGEND

- Potential Erosion Hazard
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

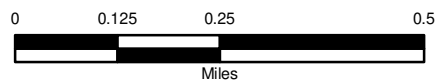
M:\PROJECTS\2008\153\00293 - FEMA - OREGON HAZARD MITIGATION PLANNING\MXD\YAMHILL\COMMUNITY HAZARD MAPS\YAMHILL COMMUNITY MAPBOOK - EROSION HAZARD AREAS.MXD



OVERVIEW MAP









CITY OF DAYTON EROSION HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN

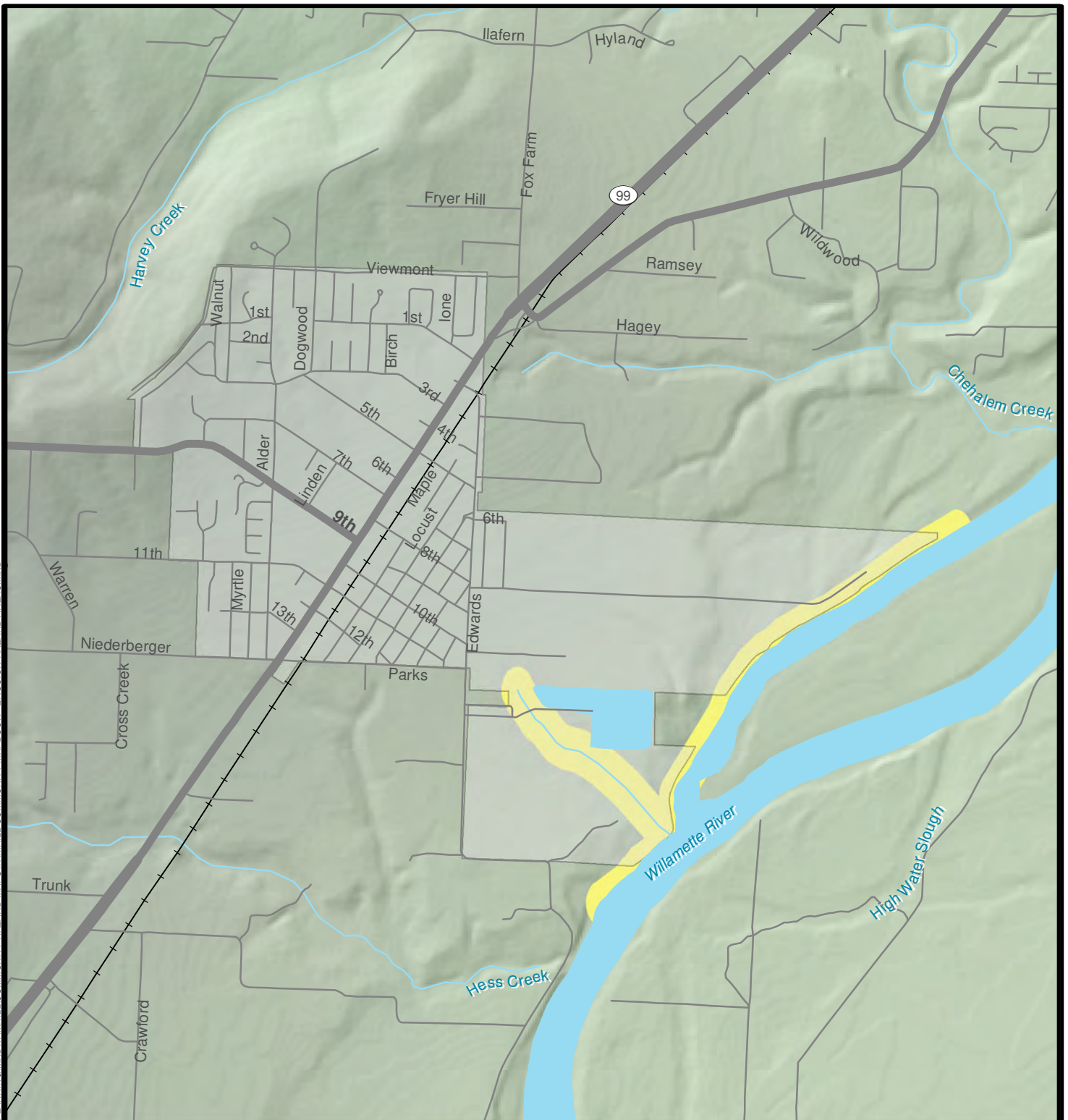


SOURCES: Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

FIG. NO:
K-14C

LEGEND

-  Potential Erosion Hazard
-  City Limits
-  Streets & Highways
-  Railroads
-  Lakes & Waterbodies
-  Streams & Waterways



OVERVIEW MAP



CITY OF DUNDEE EROSION HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



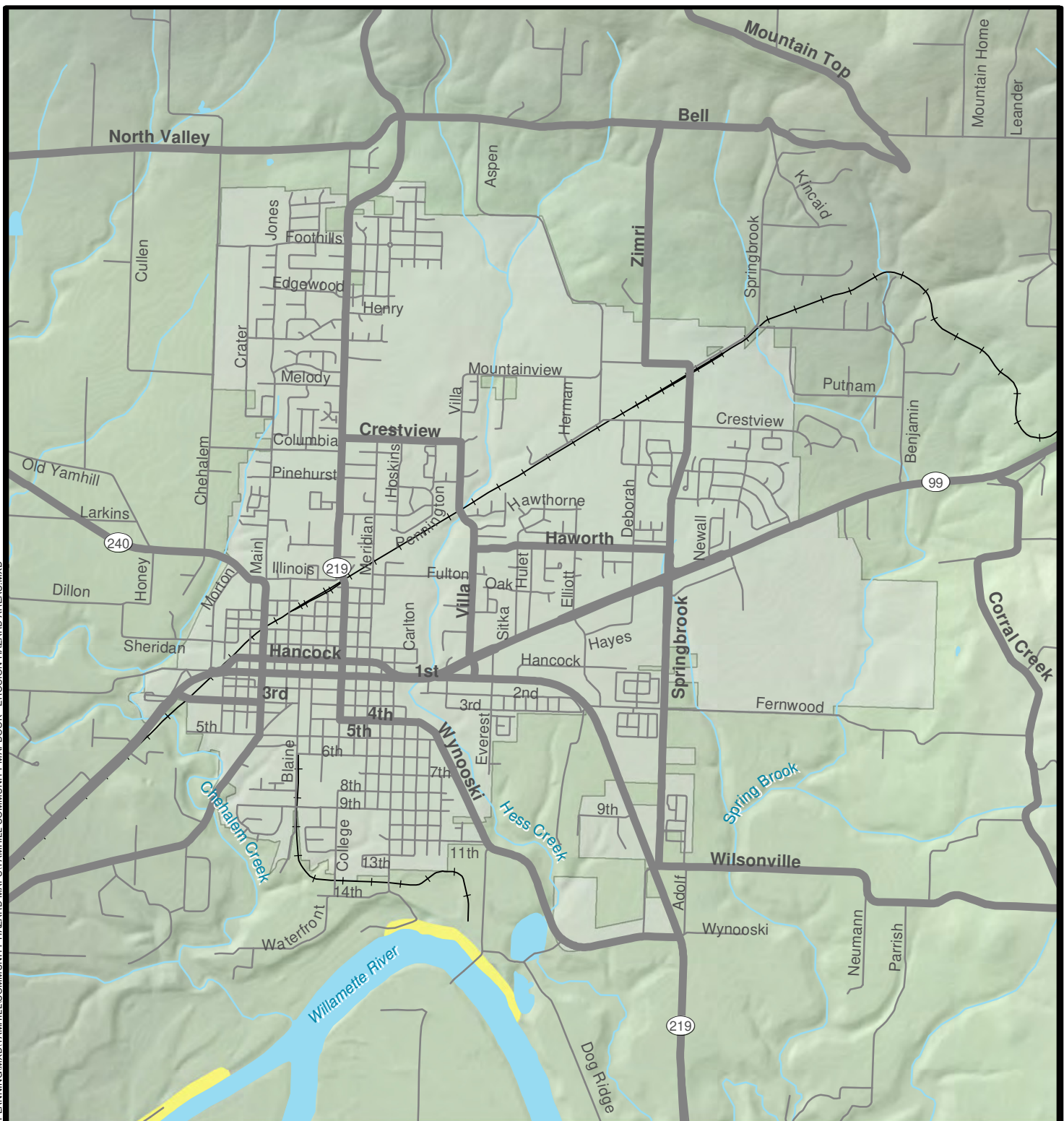
SOURCES: Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

FIG. NO:
K-14D

LEGEND

- Potential Erosion Hazard
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

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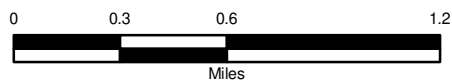


OVERVIEW MAP



CITY OF NEWBERG

EROSION HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



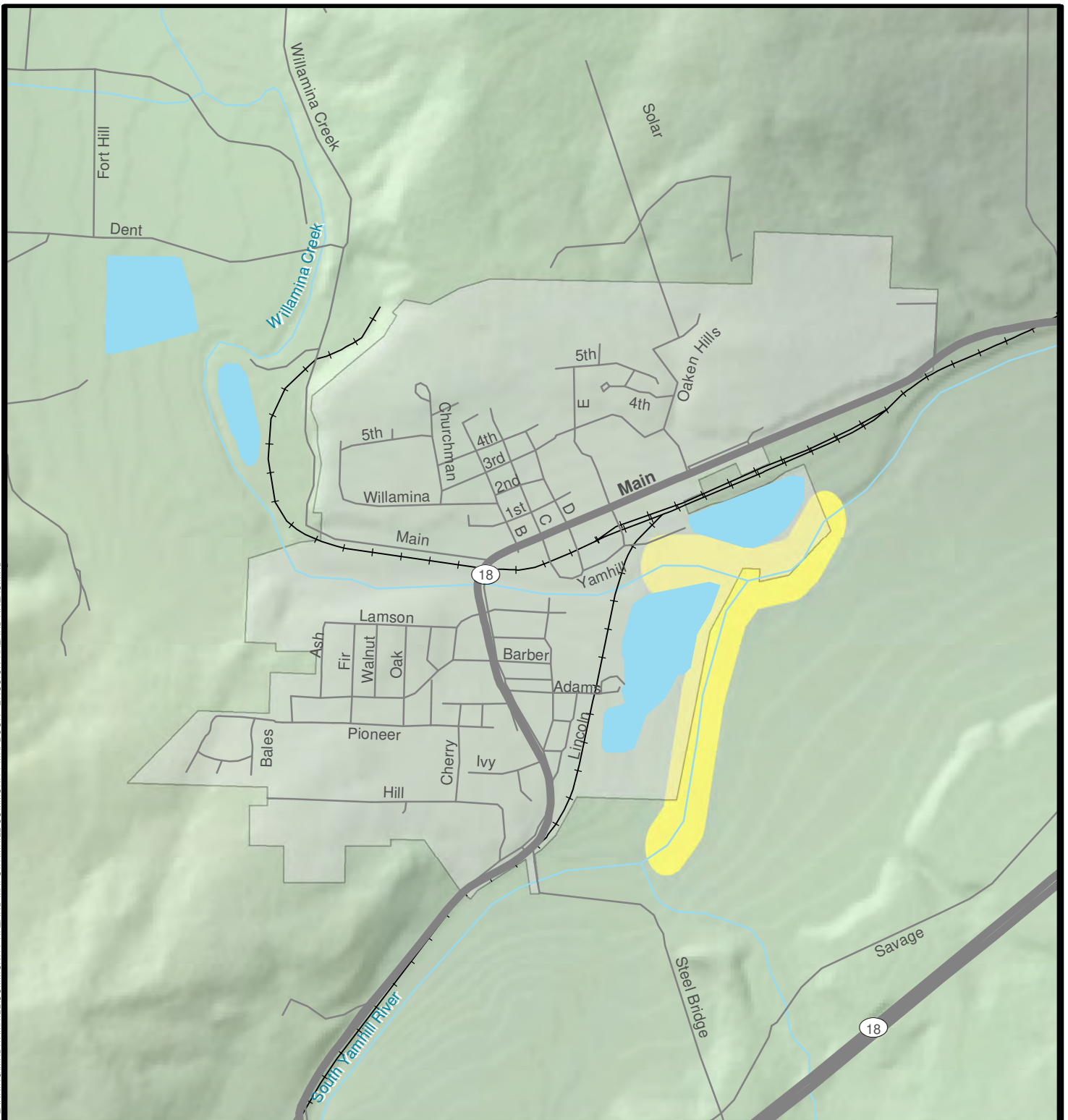
SOURCES: Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-14E

LEGEND

- Potential Erosion Hazard
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

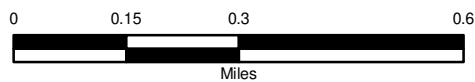


OVERVIEW MAP



CITY OF WILLAMINA

EROSION HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN

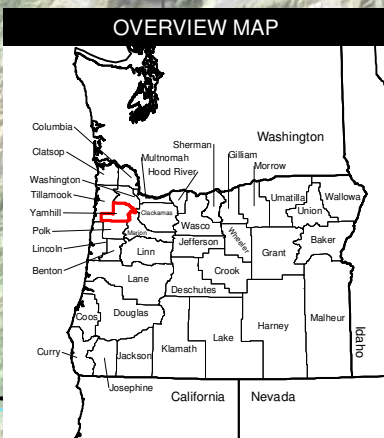
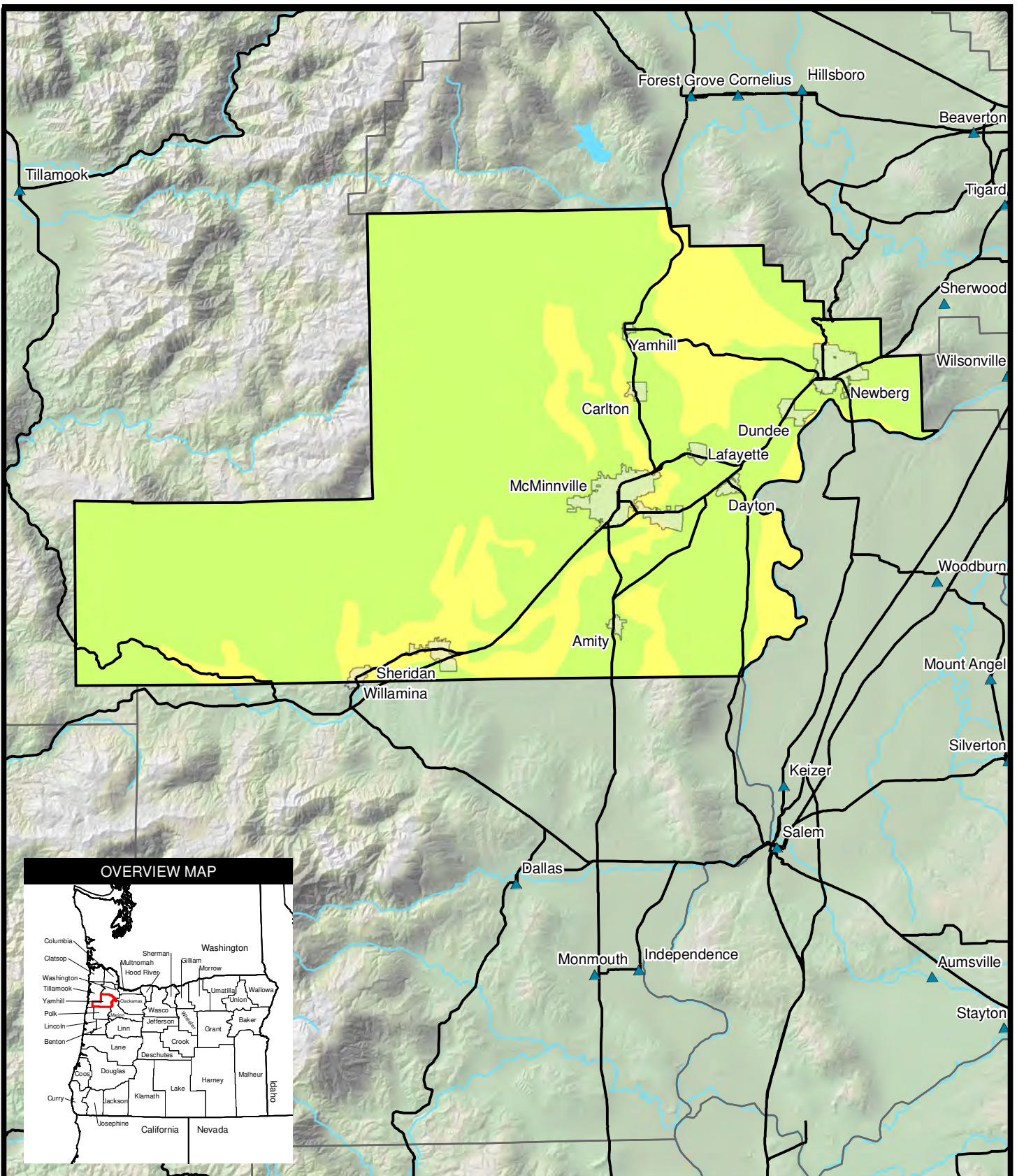


SOURCES: Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

FIG. NO:
K-14F

LEGEND

- Potential Erosion Hazard
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways



LEGEND

Expansive Soils

- Low
- Moderate
- High
- Very High

City

- City Limits
- County Boundary
- Major Road or Highway
- Lakes & Waterbodies
- Streams & Waterways

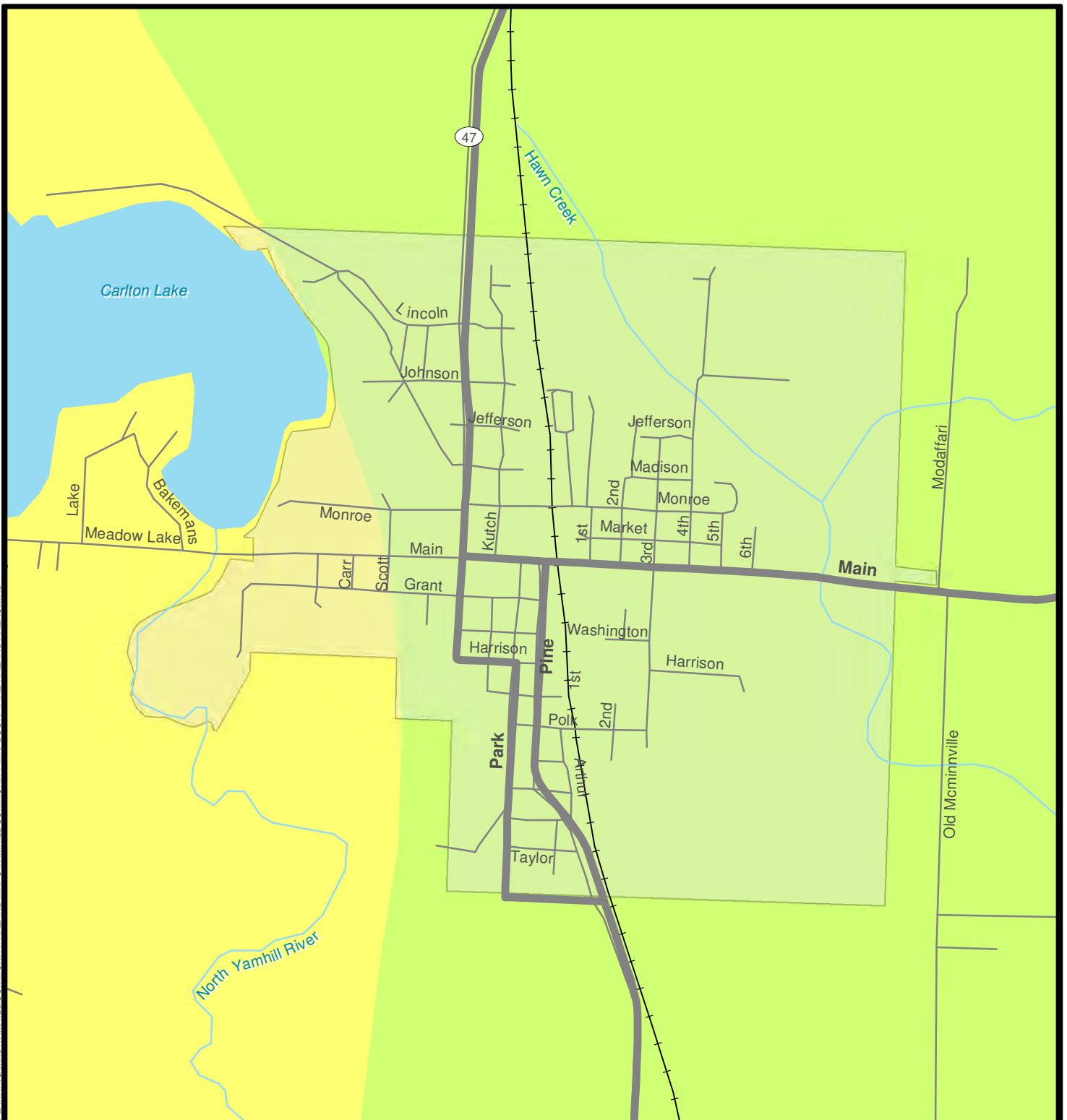
EXPANSIVE SOILS HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Soil (SSURGO), ESRI (highways 1996),
USGS (counties, cities, lakes, rivers, hillshade)
MAP DATA: July, 2008



FIG. NO:
K-15



OVERVIEW MAP



CITY OF CARLTON EXPANSIVE SOILS HAZARD AREA YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Roads (ESRI), Wildland Fire, Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

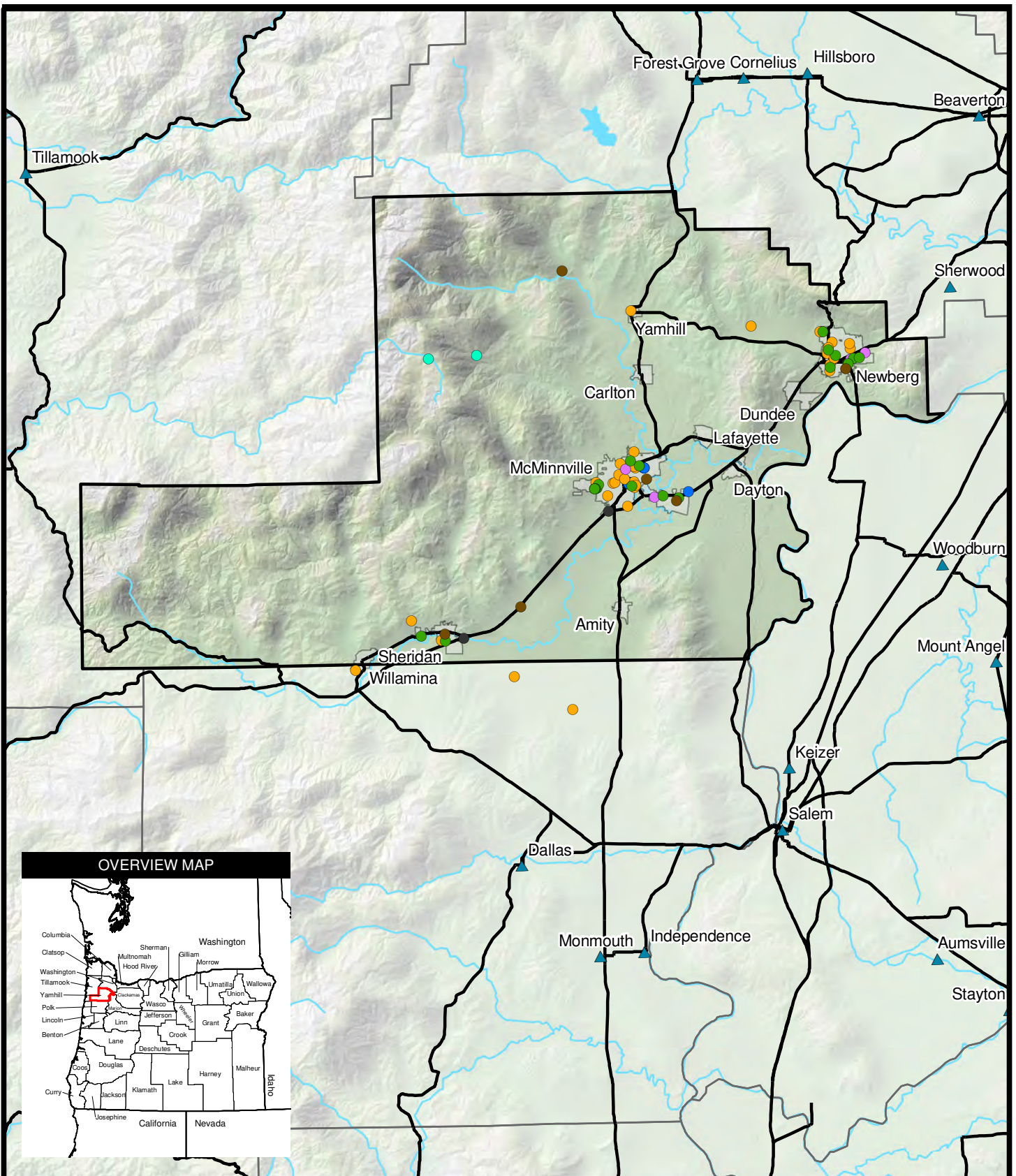


LEGEND

Expansive Soils

- Low
- Moderate
- High
- Very High
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

FIG. NO:
K-15B



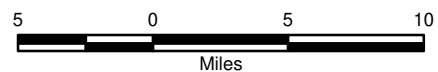
LEGEND

Critical Facilities

- Bridges
- Care Facility
- Community
- Dams
- Educational
- Government
- Ground & Air Facilities

- ▲ City
- City Limits
- County Boundary
- Major Road or Highway
- Streams & Waterways
- Lakes & Waterbodies

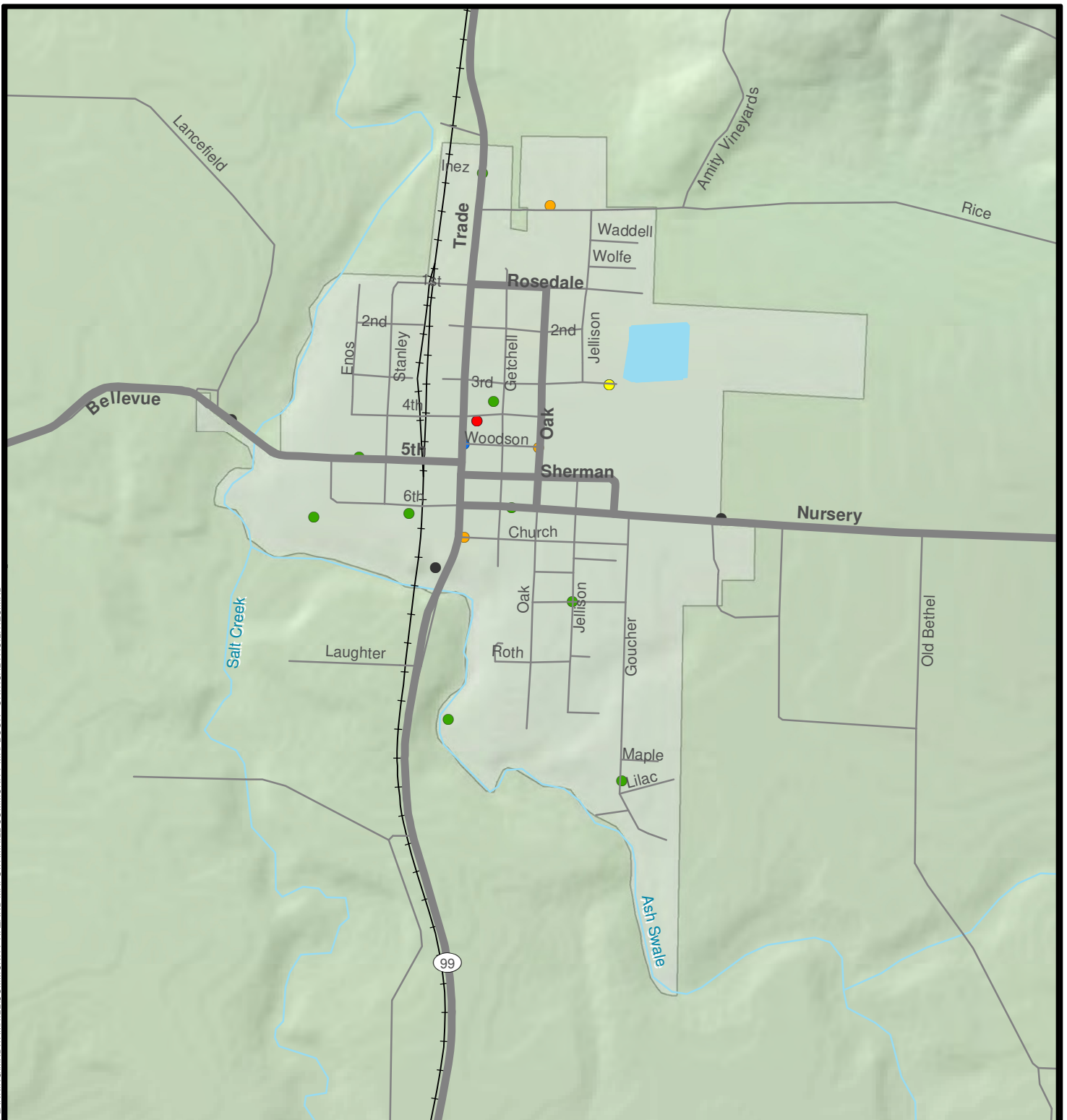
CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Critical facilities (Oregon), ESRI (highways 1996), USGS (counties, cities, lakes, rivers, hillshade) MAP DATA: July, 2008



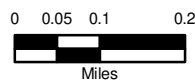
FIG. NO:
K-16



OVERVIEW MAP



CITY OF AMITY CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



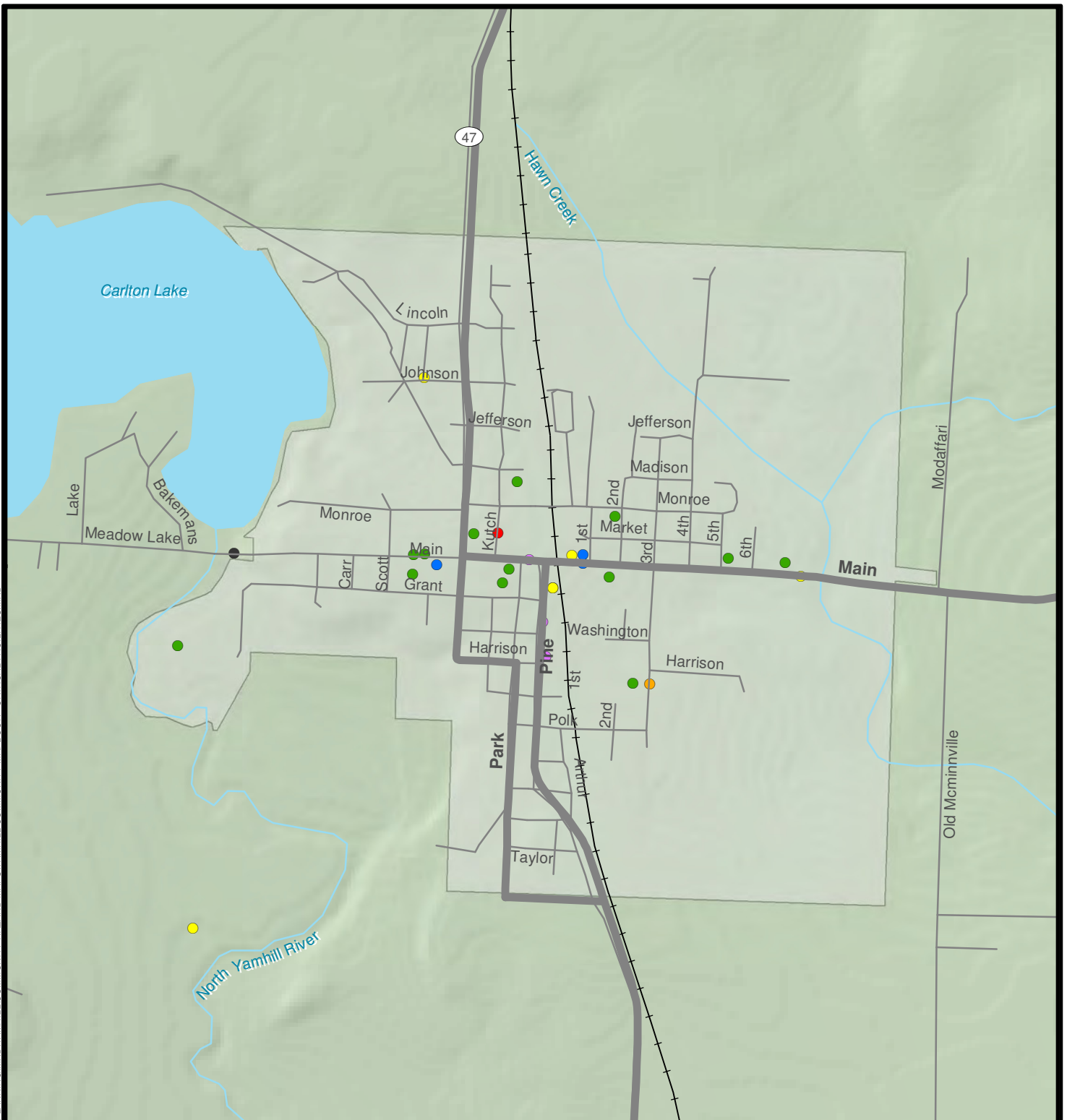
SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-17

LEGEND

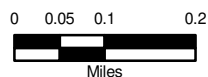
- Bridges
- Care Facility
- Community
- Dams
- Educational
- Emergency Response
- Government
- Ground & Air Facilities
- Utilities
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways



OVERVIEW MAP



CITY OF CARLTON CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

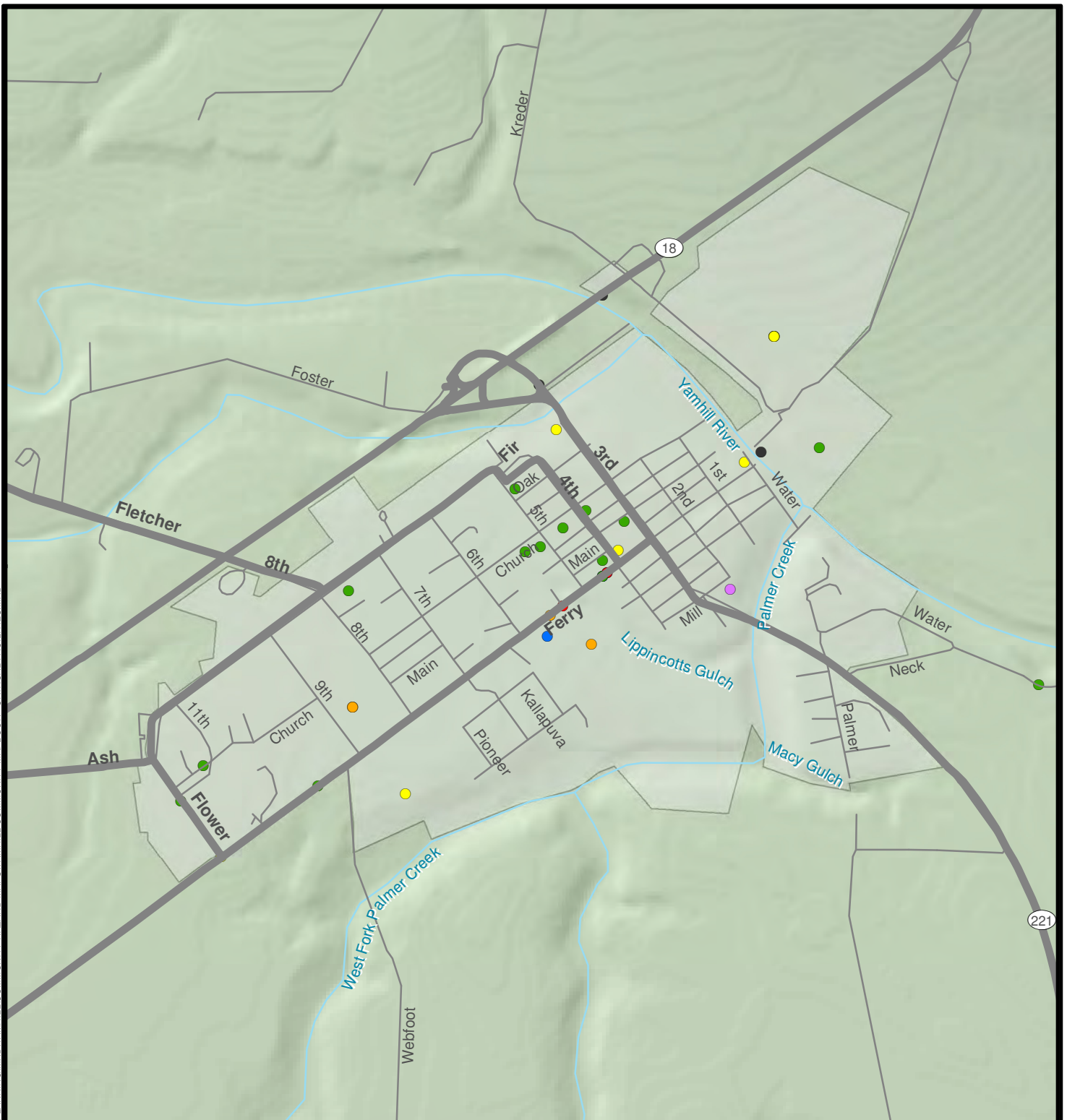


FIG. NO:
K-18

LEGEND

- Bridges
- Care Facility
- Community
- Dams
- Educational
- Emergency Response
- Government
- Ground & Air Facilities
- Utilities
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

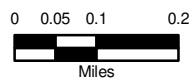
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OVERVIEW MAP



CITY OF DAYTON CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



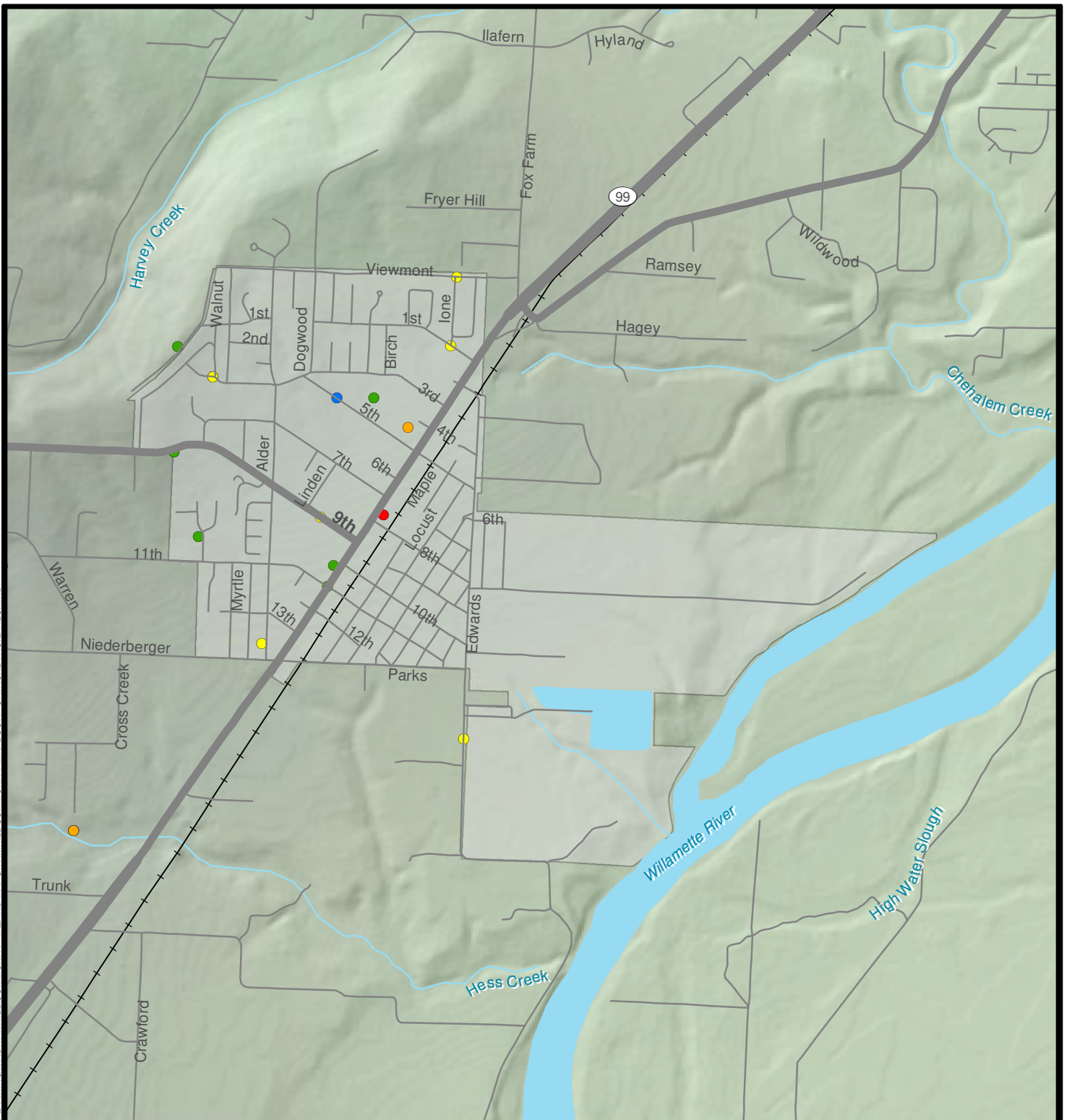
FIG. NO:
K-19

LEGEND

- Bridges
- Care Facility
- Community
- Dams
- Educational
- Emergency Response
- Government
- Ground & Air Facilities
- Utilities
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

NOTE: Critical facility coordinates were obtained from publicly available mapping databases.

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OVERVIEW MAP



CITY OF DUNDEE CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-20

LEGEND

- Bridges
- Care Facility
- Community
- Dams
- Educational
- Emergency Response
- Government
- Ground & Air Facilities
- Utilities
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

NOTE: Critical facility coordinates were obtained from publicly available mapping databases.

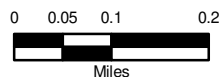


OVERVIEW MAP



CITY OF LAFAYETTE

CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

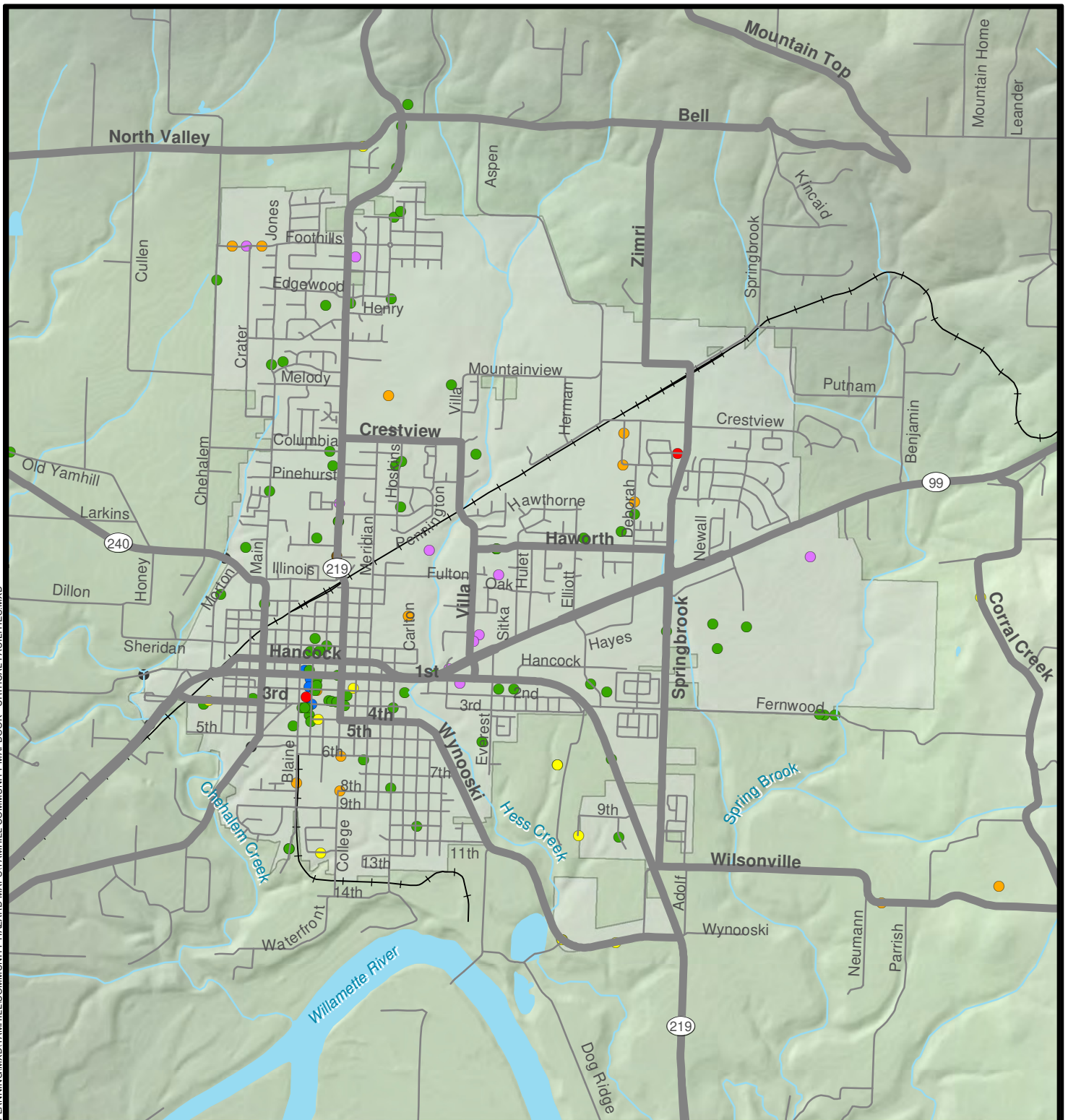


FIG. NO:
K-21

LEGEND

- Bridges
- Care Facility
- Community
- Dams
- Educational
- Emergency Response
- Government
- Ground & Air Facilities
- Utilities
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

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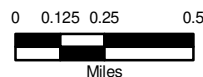


OVERVIEW MAP



CITY OF NEWBERG

CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



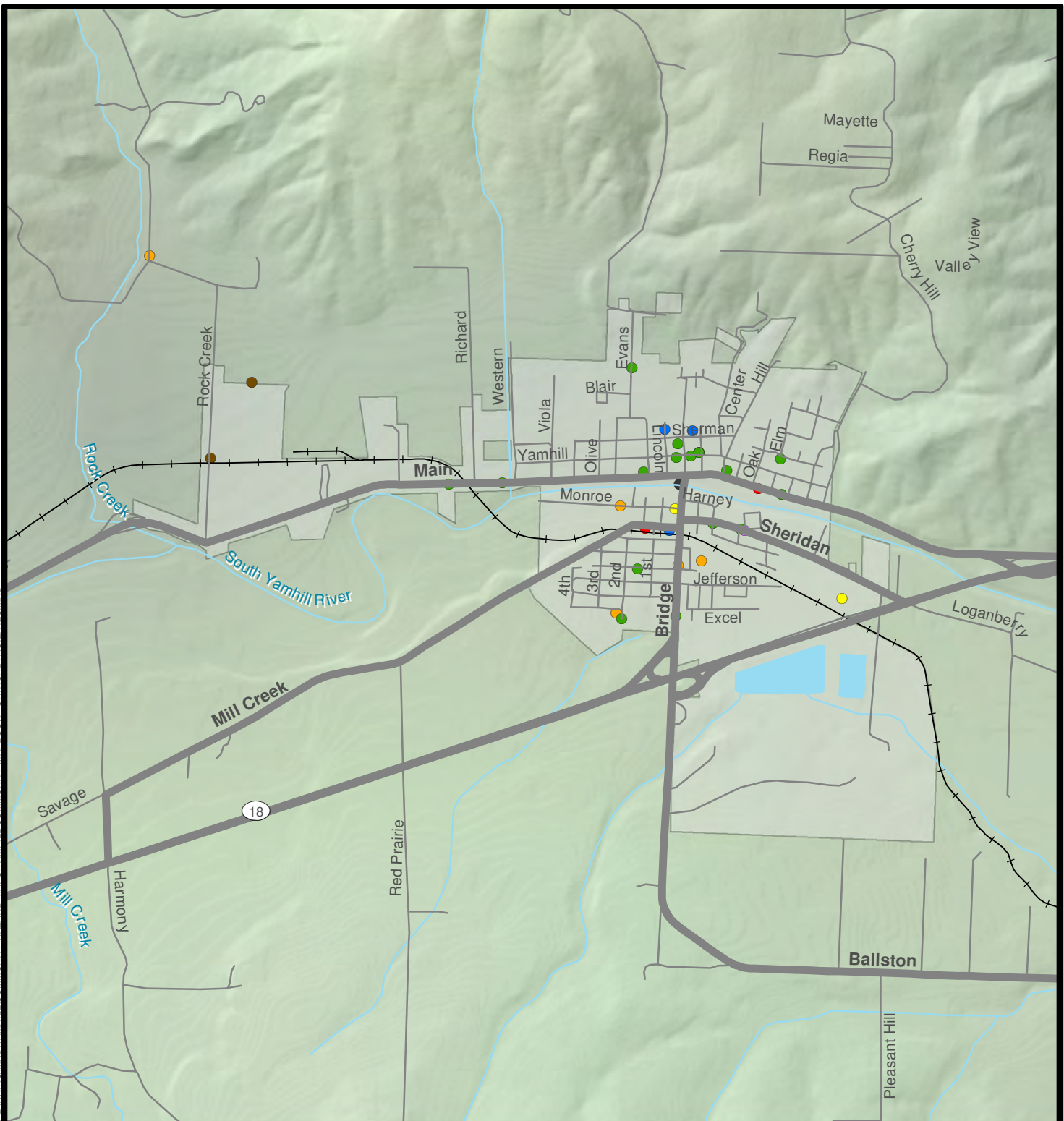
FIG. NO:
K-22

LEGEND

- Bridges
- Care Facility
- Community
- Dams
- Educational
- Emergency Response
- Government
- Ground & Air Facilities
- Utilities
- ▭ City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

NOTE: Critical facility coordinates were obtained from publicly available mapping databases.

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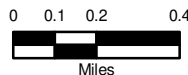


OVERVIEW MAP



CITY OF SHERIDAN

CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008

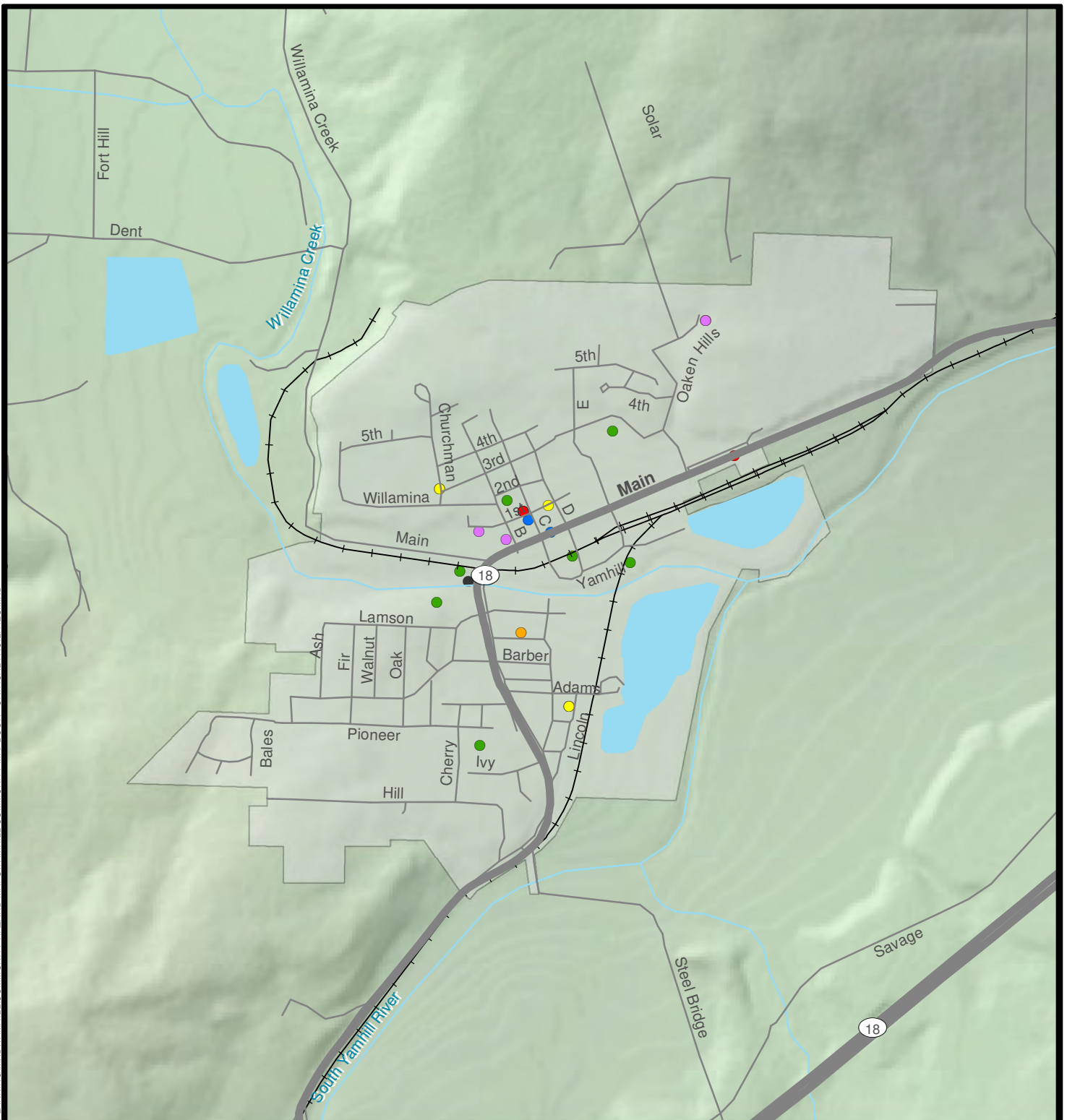


FIG. NO:
K-23

LEGEND

- Bridges
- Care Facility
- Community
- Dams
- Educational
- Emergency Response
- Government
- Ground & Air Facilities
- Utilities
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

NOTE: Critical facility coordinates were obtained from publicly available mapping databases.

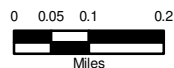


OVERVIEW MAP



CITY OF WILLAMINA

CRITICAL FACILITIES YAMHILL COUNTY HAZARD MITIGATION PLAN



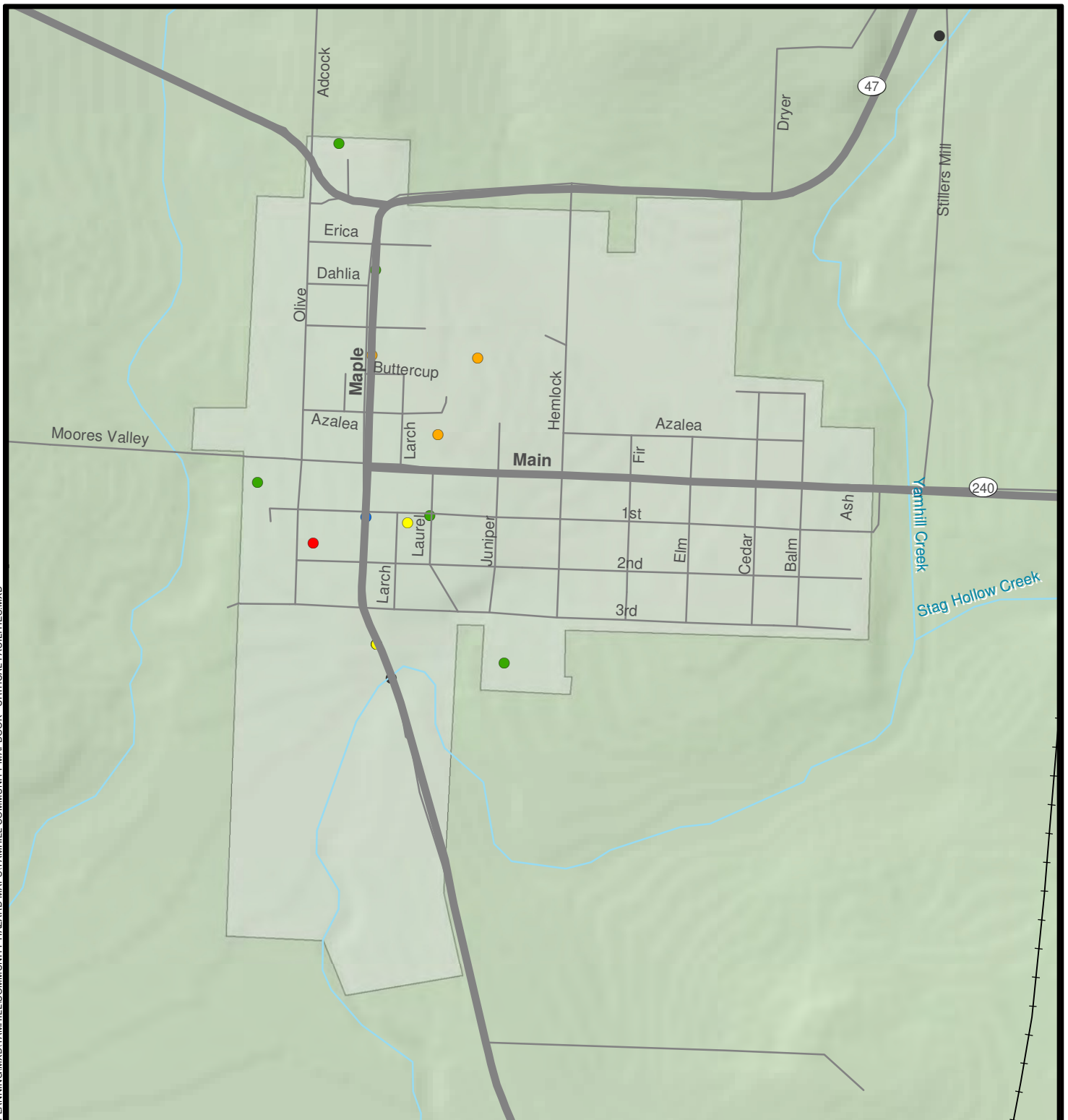
SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-24

LEGEND

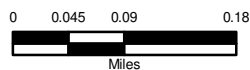
- Bridges
- Care Facility
- Community
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- City Limits
- Streets & Highways
- Railroads
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- Streams & Waterways



OVERVIEW MAP



YAMHILL CITY
CRITICAL FACILITIES
YAMHILL COUNTY
HAZARD MITIGATION PLAN



SOURCES: Critical Facilities (Oregon), Roads (ESRI), Counties, Cities, Lakes, Rivers, Hillshade (USGS) CREATED BY: TCS, Fall 2008



FIG. NO:
K-25

LEGEND

- Bridges
- Care Facility
- Community
- Dams
- Educational
- Emergency Response
- Government
- Ground & Air Facilities
- Utilities
- City Limits
- Streets & Highways
- Railroads
- Lakes & Waterbodies
- Streams & Waterways

Appendix L

FEMA Crosswalk

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Appendix M

Adoption Resolutions

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Appendix N

Steering Committee Meetings

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ELIGIBLE AND INELIGIBLE HAZARD MITIGATION ACTIVITIES

COST-SHARE:

Up to 75 percent Federal cost share. Small and impoverished communities may be eligible for up to a 90 percent Federal cost-share.

ELIGIBLE PROJECT ACTIVITIES:

- Public awareness and education (brochures, workshops, videos, etc.)
- Voluntary acquisition of real property (i.e., structures and land, where necessary) for conversion to open space in perpetuity (any hazard)
- Relocation of public or private structures (any hazard)
- Elevation of existing public or private structures to avoid coastal or riverine flooding
- Seismic structural retrofitting and nonstructural retrofitting of existing public or private structures to meet or exceed applicable building codes relative to hazard mitigation
- Hydrologic and Hydraulic studies/analyses, engineering studies, and drainage studies for the purpose of project design and feasibility determination
- Vegetation management for wildfire
- Shoreline stabilization
- Landslide stabilization
- Wetland restoration
- Protective measures for utilities (e.g., electric and gas), water and sanitary sewer systems, and/or infrastructure (e.g., roads and bridges)
- Stormwater management projects (culverts, retention basins, diversions, flapgates/floodgates) to reduce or eliminate long-term risk from flood hazards
- Localized flood control projects, such as certain ring levees, bank stabilization, and floodwall systems that are designed specifically to protect critical facilities (defined as Hazardous Materials Facilities, Emergency Operation Centers, Power Facilities, Water Facilities, Sewer and Wastewater Treatment Facilities, Communications Facilities, Emergency Medical Care Facilities, Fire Protection, and Emergency Facilities) and that do not constitute a section of a larger flood control system
- Any of the above mitigation projects for a critical facility, as defined above, may include the purchase of a generator or related equipment purchases (e.g., generator hookups) as a functional portion to the larger eligible mitigation project sub-application, as long as the generator or related equipment purchase directly relates to the hazard(s) that threatens the critical facility

INELIGIBLE PLANNING ACTIVITIES:

- Flood studies or flood mapping
- Mapping activities that are not part of a risk assessment
- Risk assessments, technical assistance, studies, or workshops not resulting in a FEMA-approved hazard mitigation plan
- Information dissemination activities exceeding 10 percent of the total cost of the planning sub-application or that are not tied directly to a PDM planning sub-application

-
- Any ground disturbing activity that would initiate the environmental review and compliance process
 - Pre-award activities not directly related to the development of the planning sub-application or implementing the proposed planning activity and limited revisions and amendments that do not result in a comprehensive hazard mitigation plan update

INELIGIBLE PROJECT ACTIVITIES:

- Major flood control projects
- Water quality infrastructure projects
- Projects that address ecological issues related to land and forest management
- Warning and alert notification systems
- Phased or partial projects
- Studies that do not result in a project (e.g., engineering designs, feasibility studies, or drainage studies that are not integral to a proposed project);
- Flood studies or flood mapping (general H&H studies not integral to project design)
- Dry flood proofing of residential structures
- Generators for noncritical facilities
- Generators and related equipment (e.g., generator hookups) for critical facilities that are not part of a larger eligible mitigation project sub-application and are not directly related to the hazard(s) that threaten that critical facility
- Any mitigation activities involving demolishing an existing structure (i.e., commercial or residential building) and building a new structure (i.e., demolition/ rebuild) in floodplains
- Projects that solely address a man-made hazard
- Response and communication equipment
- Projects that solely address maintenance or repairs of existing structures, facilities, or infrastructure (e.g., dredging and removal)
- Localized flood control projects that do not protect a critical facility or constitute a part of a larger project
- Any project for which another Federal agency has primary authority

Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion “It is important to consider...”	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, State, and Federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA BCA.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA BCA
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, State, and Federal laws

Appendix O

Public Outreach

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	<p>YAMHILL COUNTY MULTI- JURISDICTIONAL MULTI-HAZARD MITIGATION PLAN</p>

	<p><i>Planning Assistance Team</i></p>
	<ul style="list-style-type: none"> ■ Kristen Meyers, FEMA Region X ■ Dennis Sigrist, Oregon OES ■ Laura Young, URS Consultant ■ April Brehm, URS Consultant

	<p><i>What Is Hazard Mitigation Planning?</i></p>
	<p>Process to identify policies, activities and tools to implement mitigation actions</p> <ul style="list-style-type: none"> – Strengthen and enforce codes and ordinances prohibiting development in hazard-prone areas – Educate residents and businesses about development in hazard-prone areas – Improve flood control structures – Relocate, elevate or flood proof flood-prone structures

	<p><i>What is Needed from each Jurisdiction?</i></p>
	<ul style="list-style-type: none"> ■ Active Participation ■ Engagement through the Process ■ Advocacy / Enthusiasm for the Process ■ Understanding

	<p><i>Why Do We Need A Plan?</i></p>
	<ul style="list-style-type: none"> ■ Community Benefits <ul style="list-style-type: none"> – Hazard Awareness & Community Safety – Avoid Development in Hazard-Prone Areas – Develop / Improve Ordinances and Enforcement – Eligibility for Mitigation Project Funding ■ State Benefits <ul style="list-style-type: none"> – Data to Support Enhanced Mitigation Planning Efforts

	<p><i>The Planning Process</i></p>
	<ul style="list-style-type: none"> ■ Hazard Identification ■ Risk Assessment ■ Planning Goals ■ Mitigation Programs, Actions, and Projects ■ A Resolution from the Community Adopting the Plan

	Public Participation
	<ul style="list-style-type: none"> ■ Minimum Requirements ■ Newsletters ■ Websites ■ PSAs / Press Releases ■ Workshops

	Yamhill County Jurisdictions (Incorporated Cities)
	<ul style="list-style-type: none"> ■ Amity ■ Carlton ■ Dayton ■ Dundee ■ Lafayette ■ McMinnville ■ Newberg ■ Sheridan ■ Willamina ■ Yamhill

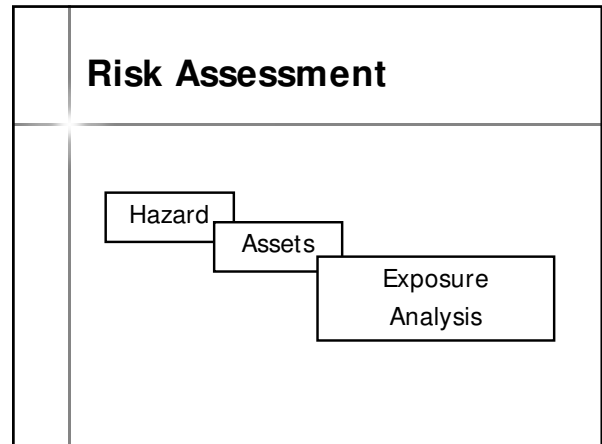
Hazard Identification		HAZARD WORKSHEET			
		Hazard	State of Oregon Plan	2006 Yamhill County Plan	Jurisdiction
		Avalanche			
		Coastal Erosion	X		
		Droughts	X	X	
		Dust Storms	X		
		Earthquake	X	X	
		El Niño/La Niña	X		
		Expansive Soils			
		Flood	X	X	
		Landslide/Debris Flow	X	X	
		Tsunami	X		
		Volcano Hazards	X		
		Wind Storms	X	X	
		Winter Storms	X	X	
		Wildland/Urban Interface Fire	X	X	
		Dam Failure			
		Man-Made / Technological Hazards			
		Disruption of Utility and Transportation Systems			
		HAZMAT Incidents			
		Terrorism			

	Risk Assessment
	<p>Hazards Profile</p> <ul style="list-style-type: none"> – General Description – History of Events – Location (Maps, GIS, etc.) – Probability – Extent – Impact

	Risk Assessment Asset Inventory
	<p>Critical facilities are local facilities that provide essential products and services to the general public</p> <ul style="list-style-type: none"> ■ Bridges ■ Care ■ Community ■ Dams ■ Educational ■ Emergency Response ■ Government ■ Ground & Air ■ Highways ■ Railroads ■ Utilities

	Risk Assessment Asset Inventory
	<p>Community Assets (Existing and Future)</p> <ul style="list-style-type: none"> – Critical Facilities <ul style="list-style-type: none"> ■ Location ■ Estimated Value ■ Resident Population (e.g. assisted living facility) – Residential and Non-Residential Buildings <ul style="list-style-type: none"> ■ Location ■ Estimated Value ■ Population

Risk Assessment Asset Inventory																											
<table border="1"> <thead> <tr> <th colspan="2">Types of Critical Facilities (from Yamhill County HMP)</th></tr> </thead> <tbody> <tr> <td>Emergency Services</td><td>Fire and Rescue Stations</td></tr> <tr> <td></td><td>Police Stations</td></tr> <tr> <td>Medical Facilities</td><td>Hospitals</td></tr> <tr> <td>Special Needs Populations</td><td>Shelters</td></tr> <tr> <td></td><td>Schools</td></tr> <tr> <td>Utilities</td><td>Public Works Facilities</td></tr> <tr> <td></td><td>Sewer</td></tr> <tr> <td></td><td>Water</td></tr> <tr> <td></td><td>Power Plants</td></tr> <tr> <td>Dams</td><td>Total 40 (7 High Hazard)</td></tr> <tr> <td>Transportation Systems</td><td>Roadways</td></tr> <tr> <td></td><td>Bridges</td></tr> </tbody> </table>		Types of Critical Facilities (from Yamhill County HMP)		Emergency Services	Fire and Rescue Stations		Police Stations	Medical Facilities	Hospitals	Special Needs Populations	Shelters		Schools	Utilities	Public Works Facilities		Sewer		Water		Power Plants	Dams	Total 40 (7 High Hazard)	Transportation Systems	Roadways		Bridges
Types of Critical Facilities (from Yamhill County HMP)																											
Emergency Services	Fire and Rescue Stations																										
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	Power Plants																										
Dams	Total 40 (7 High Hazard)																										
Transportation Systems	Roadways																										
	Bridges																										



Risk Assessment

The results of the risk assessment are summarized in the exposure analysis (example).

Hazard	Methodology	Frequency	Residential Structures			Critical Facilities			Total					
			No.	Structure Value	Contents Value	Total Value	No.	Structure Value	Contents Value	Total Value	No.	Structure Value	Contents Value	Total Value
Flood	100 Year Storm Surge	25	10	\$ 1,504,000	\$45,200,000	\$ 46,704,000	52	\$ 58,188,875	\$ 38,701,625	\$ 96,890,500	42	\$ 95,502,875	\$105,901,525	\$191,404,400
	500 Year Flood	0	0	\$ 0	\$ 0	\$ 0	1	\$ 30,150	\$ 45,250	\$ 75,400	1	\$ 30,150	\$ 45,250	\$ 75,580
Severe Weather	Descriptive	2,400	1,000	\$150,400,000	\$45,200,000	\$195,600,000	94	\$174,804,107	\$241,250,815	\$416,054,922	1094	\$305,354,197	\$308,430,815	\$613,785,012
Earthquake	USACE Brown Zone	49	17	\$ 2,270,800	\$ 1,100,400	\$ 3,371,200	16	\$ 94,227,250	\$132,240,750	\$226,468,000	42	\$ 94,444,050	\$133,305,150	\$227,749,200

Mitigation Strategy	
<p>Based on the results of the Risk Assessment:</p> <ul style="list-style-type: none"> – Establish Goals – Identify Projects – Prioritize 	

Next Steps	
<ul style="list-style-type: none"> ■ Gather Data from Worksheets ■ Present Results of the Risk Assessment ■ Prepare Mitigation Strategy ■ Finalize Plan/Community Review ■ Submit the Plan for Oregon OEM and FEMA Review ■ Adopt the Plan 	

Contractor Contact Information	
<p>Laura Young or April Brehm, URS 800-909-6787 or 907-562-3366 (laura_young@urscorp.com or april_brehm@urscorp.com)</p>	

	<p>YAMHILL COUNTY</p>
	<p>MULTI-JURISDICTIONAL MULTI-HAZARD MITIGATION PLAN</p>
	<p>DRAFT RISK ASSESSMENT PRESENTATION</p>
	<p>August 2008</p>

	<p>Planning Assistance Team</p>
	<ul style="list-style-type: none"> ■ Kristen Meyers, FEMA Region X ■ Dennis Sigrist, Oregon OES ■ Joseph Murray, Oregon OES ■ Laura Young, URS Consultant ■ Scott Simmons, URS Consultant ■ Karen Brown, URS Consultant

	<p>What Is Hazard Mitigation Planning?</p>
	<p>Process to identify policies, activities and tools to implement mitigation actions</p> <ul style="list-style-type: none"> – Strengthen and enforce codes and ordinances prohibiting development in hazard-prone areas – Educate residents and businesses about development in hazard-prone areas – Improve flood control structures – Relocate, elevate or flood proof flood-prone structures

	<p><i>Why Do We Need A Plan?</i></p>
	<ul style="list-style-type: none"> ■ Community Benefits <ul style="list-style-type: none"> – Hazard Awareness & Community Safety – Avoid Development in Hazard-Prone Areas – Develop / Improve Ordinances and Enforcement – Eligibility for Mitigation Project Funding ■ State Benefits <ul style="list-style-type: none"> – Data to Support Enhanced Mitigation Planning Efforts

	<p><i>The Planning Process</i></p>
	<ul style="list-style-type: none"> ■ Hazard Identification ■ Risk Assessment ■ Planning Goals ■ Mitigation Programs, Actions, and Projects ■ Plan Maintenance ■ A Resolution from the Community Adopting the Plan

	<p>Project Purpose</p>
	<ul style="list-style-type: none"> ■ Include Incorporated Jurisdictions ■ Update Existing County Plan

	Participating Jurisdictions
	<ul style="list-style-type: none"> ■ Yamhill County ■ City of Amity ■ City of Carlton ■ City of Dayton ■ City of Dundee ■ City of Lafayette ■ City of Newberg ■ City of Sheridan ■ City of Willamina ■ Yamhill City

	<i>Progress To-Date</i>
	<ul style="list-style-type: none"> ■ Steering Committees for Each Jurisdiction ■ Public Engagement ■ Hazard Identification ■ Asset Identification ■ Draft Risk Assessment

	Draft Risk Assessment Results - Hazards
	<p>* Hazards Identified During the Update Process</p>

	Draft Risk Assessment Results - Profiles
	<ul style="list-style-type: none"> ■ Nature ■ History of Events ■ Location (Maps, GIS, etc.) ■ Extent ■ Probability

	Draft Risk Assessment Results – Exposure Analysis

	Draft Risk Assessment Results – Vulnerability Summary
	<p>Landslide</p> <p>The potential impacts from landslides can be widespread. Potential debris flows and landslides can impact transportation and rail routes, utility systems, and water and waste treatment infrastructure along with public, private, and business structures located adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages. Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require reestablishing electrical, communication, and gas pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and waste water utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and reestablishing waste disposal capability.</p> <p>USGS elevation datasets were used to determine the landslide hazard areas within Yamhill County. Risk was assigned based on slope angle. A slope angle less than 14 degrees was assigned a low risk, a slope angle between 14 and 32 degrees was assigned a medium risk, and a slope angle greater than 32 degrees was assigned a high risk.</p> <p>Using these guidelines, Yamhill County has 9 government facilities (worth \$429,359), 3 emergency response facilities (value unknown), 12 educational facilities (worth \$15,627,576), 3 care facilities (value unknown), 1 utility (value unknown) and 2 dams (value unknown) located in areas of moderate risk, in addition to 1 care facility (value unknown), 1 utility (value unknown) and 2 dams (value unknown) located in areas of high risk.</p>

	Mitigation Strategy
	<p>Use the results of the Risk Assessment to:</p> <ul style="list-style-type: none"> – Establish Goals – Identify Projects – Prioritize

	Mitigation Project Recommendations
	<ul style="list-style-type: none"> ■ Identify actions that are also identified in other Capitol, Transportation, etc. plans ■ Identify actions that can be implemented by the homeowner (tie-downs, clear trees and other fuels away from residential structures) ■ Consider educational actions that are low cost, with high benefit

	<i>Next Steps</i>
	<ul style="list-style-type: none"> ■ Provide Comments on Risk Assessment ■ Identify Goals ■ Identify Mitigation Actions ■ Prepare Mitigation Strategy ■ Finalize Plan ■ Submit the Plan for Oregon OEM and FEMA Review ■ Adopt the Plan

	<i>Contractor Contact Information</i>
	<p>URS Laura Young Scott Simmons Karen Brown</p> <p>800-909-6787 or 907-562-3366 <small>Laura_young@urscorp.com, scott_simmons@urscorp.com, karen_m_brown@urscorp.com</small></p>

YAMHILL COUNTY – Hazard Mitigation Plan
Public Meeting, 15 August 2008

NAME	ORGANIZATION	PHONE	E-MAIL
Roger Gano	City of Newberg	503-554-7706	roger.gano@ci.newberg.or.us
Mike Keyes	Oregon Mutual Ins	503-565-3742	mikek@ORmutual.com
Scott Woods	Newberg School Dist	503-554-5024	Woods@newberg.k12.or.us
Laura Tschabod	Yamhill County	503/434-7564	tschabod@co.yamhill.or.us
Richard A Howard Sr	City of Yamhill	503-201-0428	rsuper@cityofyamhill.com
Stanley G. Parnozich	Newburg Sch Dist	971-237-9598	sternack@newburg.k12.or.us
JOSEPH MURRAY	CMD-CEM	503-278-2911 X22240	jmurray@cem.state.or.us

8PM

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YAMHILL COUNTY – Hazard Mitigation Plan
Public Meeting, 15 August 2008

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YAMHILL COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

April 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Yamhill County Multi-Jurisdictional Hazard Mitigation Plan Update. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the Yamhill County Website at <http://www.co.yamhill.or.us/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the update of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

Why is it important to update the plan?

FEMA requires that hazard mitigation plans be updated at least every five years. FEMA recommends an update after a major disaster. The period following a disaster provides a unique opportunity to evaluate hazard exposure and existing mitigation activities. Yamhill County adopted a FEMA-approved Hazard Mitigation Plan in May 2006. As a result of the federally declared disaster in December 2007, FEMA is recommending and providing funding for technical assistance to each of the incorporated cities to prepare a local plan. This local plan will be annexed into the forthcoming updated Yamhill County Multi-Jurisdictional Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We are currently in the very beginning stages of updating the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Yamhill County.

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Yamhill County that the State or County is not aware of, and any additional hazards that may not be on the list.

*Hazard matrix derived from the State of Oregon and Yamhill County Hazard Mitigation Plans

The planning team is being lead by John Boynton, Emergency Manager. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

[illegible]

April Brehm
URS Corporation
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Anchorage, Alaska 99503
907-261-9743 or 800-909-6787
april_brehm@urscorp.com

CITY OF YAMHILL HAZARD MITIGATION PLAN

April 2008

First Edition

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The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Yamhill.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in the City of Yamhill that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	City of Yamhill
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
Wildland/Urban Interface Fire	X	X		
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

[illegible]

The Planning Team

The planning team is being lead by Richard Howard Sr., City Superintendent. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the City of Yamhill Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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CITY OF YAMHILL HAZARD MITIGATION PLAN

June 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the City of Yamhill Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Yamhill Website at <http://www.cityofyamhill.com/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Yamhill.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in the City of Yamhill that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	City of Yamhill
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
	Wildland/Urban Interface Fire	X	X	
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

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The Planning Team

The planning team is being lead by Richard Howard Sr., City Superintendent. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the City of Yamhill Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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WILLAMINA HAZARD MITIGATION PLAN

June 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Willamina Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Willamina Website at <http://www.ci.willamina.or.us/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Willamina.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Willamina that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	Willamina
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
Wildland/Urban Interface Fire	X	X		
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

[illegible]

The Planning Team

The planning team is being lead by ChrisAnn Harris, Office Coordinator. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the Willamina Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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SHERIDAN HAZARD MITIGATION PLAN

July 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Sheridan Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the County of Yamhill Website at <http://www.co.yamhill.or.us/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Sheridan.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Sheridan that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	Sheridan
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
	Wildland/Urban Interface Fire	X	X	
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

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The Planning Team

The planning team is being lead by Frank Sheridan, City Manager. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the Sheridan Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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NEWBERG HAZARD MITIGATION PLAN

June 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Newberg Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Newberg Website at <http://www.ci.newberg.or.us/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Newberg.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Newberg that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	Newberg
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
Wildland/Urban Interface Fire	X	X		
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

[illegible]

The Planning Team

The planning team is being lead by Roger Gano, Emergency Management Director. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the Newberg Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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LAFAYETTE HAZARD MITIGATION PLAN

June 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Lafayette Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Lafayette Website at <http://www.ci.lafayette.or.us/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Lafayette.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Lafayette that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	Lafayette
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
Wildland/Urban Interface Fire	X	X		
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

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The Planning Team

The planning team is being lead by Diane Rinks, City Administrator. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the Lafayette Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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DUNDEE HAZARD MITIGATION PLAN

June 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Dundee Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Dundee Website at <http://www.dundeecity.org/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Dundee.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Dundee that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	Dundee
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
Wildland/Urban Interface Fire	X	X		
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

The Planning Team

The planning team is being lead by Rob Daykin, City Administrator. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the Dundee Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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DAYTON HAZARD MITIGATION PLAN

June 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Dayton Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Dayton Website at <http://www.ci.dayton.or.us/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Dayton.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Dayton that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	Dayton
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
Wildland/Urban Interface Fire	X	X		
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

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The Planning Team

The planning team is being lead by Sue Hollis, City Manager. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the Dayton Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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CARLTON HAZARD MITIGATION PLAN

April 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Carlton Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Carlton Website at <http://www.ci.carlton.or.us/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Carlton.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Carlton that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	Carlton
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
Wildland/Urban Interface Fire	X	X		
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

This image shows a full page of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

The Planning Team

The planning team is being lead by Steven Weaver, City Manager. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late July 2008 to present the results of the risk assessment.

We encourage you to take an active part in the Carlton Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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AMITY HAZARD MITIGATION PLAN

August 2008

First Edition

This newsletter is the first in a series of newsletters regarding the preparation of the Amity Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Amity Website at <http://www.ci.amity.or.us/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Amity.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in Amity that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	Amity
Natural Hazards	Avalanche			
	Coastal Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	El Niño/La Niña	X		
	Expansive Soils			
	Flood	X	X	
	Lanslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
Winter Storms	X	X		
Wildland/Urban Interface Fire	X	X		
Man-Made / Technological Hazards	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards				

*Hazard matrix derived from the State of Oregon and Yamhill County Hazard Mitigation Plans

The Planning Team

The planning team is being lead by Jennifer Elkins, City Recorder. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting is anticipated in late August 2008 to present the results of the risk assessment.

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

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We encourage you to take an active part in the Amity Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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CITY OF YAMHILL HAZARD MITIGATION PLAN

November 2008

Second Edition

This newsletter is the first in a series of newsletters regarding the preparation of the City of Yamhill Hazard Mitigation Plan. It has been prepared to inform interested agencies, stakeholders, and the public about the project and to solicit comments. This and subsequent newsletters can be found on the City of Yamhill Website at <http://www.cityofyamhill.com/>.

The Federal Emergency Management Agency (FEMA) is providing technical assistance to your community to facilitate the preparation of a natural hazards mitigation plan. The plan will identify hazards, such as flood, severe weather, and earthquake. The plan will also identify the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process will be documented as part of the project. The purpose of the project is to ensure that each incorporated city in the county is eligible for mitigation project funding in the event of a declared disaster.

What is Hazard Mitigation?

Across the United States, natural and man-made/technological disasters have increasingly caused injury, death, property damage, and interruption of business and government services. The toll on individuals, families, and businesses can be very high. The time, money, and emotional effort required to respond to and recover from these disasters take public resources and attention away from other important programs and problems.

The people and property in the State of Oregon are at risk from a variety of hazards that have the potential for causing human injury, property damage, or environmental harm.

Why do we need a Hazard Mitigation Plan?

The purpose of hazard mitigation planning is to implement projects that eliminate the risk or reduce the severity of hazards on people and property. Mitigation programs may include short- and long-term activities to reduce the hazards; reduce exposure to hazards; or reduce the effects of hazards. Mitigation could include better preparation, response, and recovery measures. Examples of hazard mitigation activities include relocating buildings, developing or strengthening building codes, and educating residents and building owners.

A community is eligible to receive grant money for mitigation programs by preparing a FEMA-approved Hazard Mitigation Plan.

The Planning Process

There are very specific federal requirements that must be met when preparing a Hazard Mitigation Plan. These requirements are commonly referred to as the Disaster Mitigation Act of 2000, or DMA2000. Information about the requirements may be found on the Internet at: <http://www.fema.gov/fima/ifrs.shtm>.

The DMA2000 requires the plan to document the following topics:

- ☐ Planning process
- ☐ Hazard identification
- ☐ Risk assessment
- ☐ Goals
- ☐ Mitigation programs, actions, and projects
- ☐ A resolution from the community adopting the plan.

We need your help!

We are currently in the very beginning stages of preparing the plan, and are requesting your input at this time to identify the natural and man-made/technological hazards that occur in Yamhill.

Hazard Identification

The State of Oregon and Yamhill County have identified natural and man-made/technological hazards that occur in the general area. Please use the following table to identify any hazards that you have observed in the City of Yamhill that the State or County is not aware of, and any additional hazards that may not be on the list.

Yamhill County Hazard Worksheet				
Hazard		State of Oregon Plan	Yamhill County Plan	City of Yamhill
Natural Hazards	Avalanche			
	Riverine Erosion	X		
	Droughts	X	X	
	Dust Storms	X		
	Earthquake	X	X	
	ENSO (El Niño/La Niña)	X		
	Expansive Soils			
	Flood	X	X	
	Landslide/Debris Flow	X	X	
	Tsunami	X		
	Volcano Hazards	X		
	Wind Storms	X	X	
	Winter Storms	X	X	
Man-Made / Technological Hazards	Wildland/Urban Interface Fire	X	X	
	Dam Failure			
	HAZMAT incidents			
	Terrorism			
Additional Hazards	Infectious Disease Epidemics			

The Planning Team

The planning team is being lead by Richard Howard Sr., City Superintendent. URS Corporation is also providing technical assistance to the planning team. FEMA and the State of Oregon, Office of Emergency Services, will provide guidance through the planning process.

Public involvement will continue throughout the project. The goal is to receive comments, identify key issues of concern, and improve ideas for mitigation. A public meeting was held August 15 and 18, 2008 to present the results of the risk assessment.

Additional Information

Please provide any historic information about specific hazards as you recall in the space below. Needed information includes type of hazard, date, injuries/fatalities, types of damage, and estimated value of damage.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

We encourage you to take an active part in the City of Yamhill Hazard Mitigation Plan preparation. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding this important project. If you have any questions, comments, or requests for more information, please contact one of the following:

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Appendix P

Benefit-Cost Analysis Fact Sheet

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Benefit-Cost Analysis Fact Sheet

Hazard mitigation projects are specifically aimed at reducing or eliminating future damages. Although hazard mitigation projects may sometimes be implemented in conjunction with the repair of damages from a declared disaster, the focus of hazard mitigation projects is on strengthening, elevating, relocating, or otherwise improving buildings, infrastructure, or other facilities to enhance their ability to withstand the damaging impacts of future disasters. In some cases, hazard mitigation projects may also include training or public-education programs if such programs can be demonstrated to reduce future expected damages.

A Benefit-Cost Analysis (BCA) provides an estimate of the “benefits” and “costs” of a proposed hazard mitigation project. The benefits considered are avoided future damages and losses that are expected to accrue as a result of the mitigation project. In other words, benefits are the reduction in expected future damages and losses (i.e., the difference in expected future damages before and after the mitigation project). The costs considered are those necessary to implement the specific mitigation project under evaluation. Costs are generally well determined for specific projects for which engineering design studies have been completed. Benefits, however, must be estimated probabilistically because they depend on the improved performance of the building or facility in future hazard events, the timing and severity of which must be estimated probabilistically.

All Benefit-Costs must be:

- Credible and well documented
- Prepared in accordance with accepted BCA practices
- Cost-effective ($BCR \geq 1.0$)

General Data Requirements:

- All data entries (other than Federal Emergency Management Agency [FEMA] standard or default values) MUST be documented in the application.
- Data MUST be from a credible source.
- Provide complete copies of reports and engineering analyses.
- Detailed cost estimate.
- Identify the hazard (flood, wind, seismic, etc.).
- Discuss how the proposed measure will mitigate against future damages.
- Document the Project Useful Life.
- Document the proposed Level of Protection.
- The Very Limited Data (VLD) BCA module cannot be used to support cost-effectiveness (screening purposes only).
- Alternative BCA software MUST be approved in writing by FEMA HQ and the Region prior to submittal of the application.

Damage and Benefit Data

- Well documented for each damage event.
- Include estimated frequency and method of determination per damage event.
- Data used in place of FEMA standard or default values MUST be documented and justified.
- The Level of Protection MUST be documented and readily apparent.
- When using the Limited Data (LD) BCA module, users cannot extrapolate data for higher frequency events for unknown lower frequency events.

Building Data

- Should include FEMA Elevation Certificates for elevation projects or projects using First Floor Elevations (FFE's).
- Include data for building type (tax records or photos).
- Contents claims that exceed 30 percent of building replacement value (BRV) MUST be fully documented.
- Method for determining BRVs MUST be documented. BRVs based on tax records MUST include the multiplier from the County Tax Assessor.
- Identify the amount of damage that will result in demolition of the structure (FEMA standard is 50 percent of pre-damage structure value).
- Include the site location (i.e., miles inland) for the Hurricane module.

Use Correct Occupancy Data

- Design occupancy for Hurricane shelter portion of Tornado module.
- Average occupancy per hour for the Tornado shelter portion of the Tornado module.
- Average occupancy for Seismic modules.

Questions to Be Answered

- Has the level of risk been identified?
- Are all hazards identified?
- Is the BCA fully documented and accompanied by technical support data?
- Will residual risk occur after the mitigation project is implemented?

Common Shortcomings

- Incomplete documentation.
- Inconsistencies among data in the application, BCA module runs, and the technical support data.
- Lack of technical support data.
- Lack of a detailed cost estimate.
- Use of discount rate other than FEMA-required amount of 7 percent.

-
- Overriding FEMA default values without providing documentation and justification.
 - Lack of information on building type, size, number of stories, and value.
 - Lack of documentation and credibility for FFEs.

Use of incorrect Project Useful Life (not every mitigation measure = 100 years).

Appendix Q

Plan Maintenance Documents

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Local Mitigation Plan Review Crosswalk: Monitoring, Evaluating, and Updating the Plan (Element A)
Tribal Mitigation Plan Review Crosswalk: Monitoring, Evaluating, and Updating the Plan (Element A)

HMP Progress Report			
Progress Report Period From (date):		To (date):	
Plan Title:			
Description of Plan:			
Implementing Agency:			
Contact Name:			
Contact E-mail and Number:			
Summary of Progress of HMP for this Reporting Period			
1. Did any hazard / disaster events occur during this report period? If so, list events.			
2. Did anyone from the public comment on the plan during this reporting period? If so, list the comments.			
3. Were any mitigation projects identified in the HMP implemented during this reporting period?			

4. What obstacles, problems, or delays did any current or ongoing mitigation projects encounter, if any? How were the problems resolved?

Local Mitigation Plan Review Crosswalk: Monitoring, Evaluating, and Updating the Plan (Elements B & C)

Tribal Mitigation Plan Review Crosswalk: Monitoring, Evaluating, and Updating the Plan (Elements B & C)

Annual Review Questionnaire				
Project Title	Questions	Yes	No	Comments
PLANNING PROCESS	Are there internal or external organizations and agencies that have been invaluable to the planning process or to mitigation action?			
	Are there procedures (e.g., meeting announcements, plan updates) that can be done differently or more efficiently?			
	Has the Planning Team undertaken any public outreach activities regarding the HMP or a mitigation project?			
HAZARD ANALYSIS	Has the natural and/or human-caused disaster occurred in this reporting period?			
	Are there natural and/or human-caused hazards that have not been addressed in this HMP and should be?			
	Are additional maps or new hazard studies available? If so, what are they and what have they revealed?			
VULNERABILITY ANALYSIS	Do any new critical facilities or infrastructure need to be added to the asset lists?			

	Have there been changes in development trends that could create additional risks?			
CAPABILITY ASSESSMENT	Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?			
MITIGATION STRATEGY	Should new mitigation actions be added to the Implementation Strategy/Plan?			
	Are the mitigation actions listed in a community's Implementation Strategy/Plan appropriate for available resources?			

Local Mitigation Plan Review Crosswalk: Not required (may be used for internal reporting)

Tribal Mitigation Plan Review Crosswalk: Reviewing Progress (Elements A & B)

Mitigation Project Progress Report			
Progress Report Period From (date):		To (date):	
Project Title and Project ID:			
Description of Project:			
Implementing Agency:			
Contact Name:			
Contact E-mail and Number:			
Grant/Finance Administrator:			
Total Project Cost:			
Anticipated Cost Overrun/Underrun:			
Date of Project Approval:			
Project Start Date:			
Anticipated Completion Date:			

Summary of Progress of Project for this Reporting Period
1. What was accomplished during this reporting period?
2. What obstacles, problems, or delays did the project encounter, if any? How were the problems resolved?